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ABSTRACT

This document contains teacher's materials for an 8-unit course in wildlife conservation and management for 11th and 12th graders. The units are as follows: Making Observations and Records of Wildlife; Habitat Analysis and Evaluation; Collection and Preservation of Biological Materials; Wildlife Population Analysis; Identifying and Controlling Wildlife Damage; Alligator Production and Harvesting; Developing Economic Returns to the Land Owner from Wildlife Management; and Management of Farm Ponds for Sport Fishing. Materials in each unit include an introduction, list of competencies, general and specific performance objectives, suggested interest approaches, a unit outline, recommendations for evaluation and testing, a list of required equipment and supplies, supplementary materials, and a resource section. Appendices follow the units for which they are appropriate and provide tables, forms, diagrams, drawings, and other supplementary materials. (CML)

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Vocational Education Research

Title: Wildlife Conservation and Management Curriculum Guide for Vocational Agriculture/Agribusiness

University of Southwestern Louisiana

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WILDLIFE CONSERVATION AND MANAGEMENT CURRICULUM

GUIDE FOR VOCATIONAL AGRICULTURE/AGRIBUSINESS

BULLETIN NO. 1853

PROJECT DIRECTOR

Dr. David C. Drueckhammer

Funded by
The State of Louisiana
Department of Education
Office of Vocational Education

University of Southwestern Louisiana

December, 1988

FOREWORD

Conservation and management of wildlife is vital to our economy, both as a business and a recreational enterprise. It is incumbent upon those of us responsible for educating our students to provide them with quality instructional materials in this critical area. It is our hope that with excellent learning tools and instruction, we can shape a better tomorrow for the citizens of this state.

Funding to accomplish production of WILDLIFE CONSERVATION AND MANAGEMENT CURRICULUM GUIDE FOR VOCATIONAL AGRICULTURE/AGRIBUSINESS was provided by the Louisiana State Department of Education to the University of Southwestern Louisiana. It represents the collaborative efforts of outstanding vocational teachers across the state. We believe this guide will make a major contribution to the improvement of instruction in Louisiana classrooms, enabling us to attain our goal.

Wilmer S. Cody
STATE SUPERINTENDENT OF EDUCATION

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WILDLIFE CONSERVATION AND MANAGEMENT
Eleventh and Twelfth Grades
3 Weeks

Course Description

An instructional program that provides individuals in high school vocational agriculture/agribusiness the opportunity to obtain skills and knowledge in the proper management of wildlife habitat and wildlife species for the sustaining of suitable wildlife populations. It includes the techniques of wildlife management such as habitat analyses, estimating populations, record keeping systems, criteria for determining sex and age of wildlife species. Also included in this curriculum are units on identifying, evaluating and controlling damage from wildlife; the production and harvesting of alligators; the management of farm ponds for fishing; and developing economic returns from wildlife management. Prerequisites are Vocational Agriculture/ Agribusiness I and II. Enrollment is recommended for eleventh and twelfth grade students.

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RATIONALE

Several species of wildlife have provided significant economic returns to the landowners of Louisiana, as well as entertainment for Louisiana citizens through hunting and fishing. For these economic returns and entertainment to be maintained, for the people of Louisiana, careful management of wildlife resources must be conducted.

In order to train high school vocational agriculture/agribusiness students and adults in the proper techniques of wildlife conservation and management, this curriculum guide was developed. These curriculum materials provide information that will allow a larger number of students enrolled in vocational agriculture/agribusiness classes the opportunity to conduct Supervised Occupational Experience programs using wildlife conservation and management.

DESIGN OF THE GUIDE

The Wildlife Conservation and Management Curriculum Guide for Vocational Agriculture/Agribusiness is composed of eight units. Each unit begins with a brief introduction, competencies, general and specific performance objectives, methodology, suggested interest approaches, and a unit outline.

Specific objectives are included for each topic. Each objective is separated from the other material with a line drawn above and below the objective. The content is organized to facilitate a logical presentation of information. Suggested student activities are provided for each objective to enable students to achieve the objective. Additional activities may be added by the teacher. The activities listed are to assist teachers in creativity.

Appendices for units are provided immediately following the unit. These may be used to make visual aids for classroom use. Following the appendices are unit tests and answer sheets. The tests may be duplicated for classroom use or may serve as a guide for the teacher in test development.

Each unit includes recommendations for evaluation and testing, a list of needed equipment and supplies, supplementary materials, and a resource section. Listed in the resource section are references available to the teacher to supplement the curriculum guide.

Pages are numbered for each unit, e.g., a page numbered III-4 would be the fourth page of Unit III.

CONTENT OUTLINE

WILDLIFE CONSERVATION AND MANAGEMENT

ELEVENTH AND TWELFTH GRADES

Unit	Title	Suggested Time Schedule
Unit I	Making Observations and Records of Wildlife	3-4 days
Unit II	Habitat Analysis and Evaluation	2-3 days
Unit III	Collection and Preservation of Biological Materials	3-4 days
Unit IV	Wildlife Population Analysis	3-4 days
Unit V	Identifying and Controlling Wildlife Damage	3-4 days
Unit VI	Alligator Production and Harvesting	3-4 days
Unit VII	Developing Economic Returns to the Land Owner from Wildlife Management	2-3 days
Unit VIII	Management of Farm Ponds for Sport Fishing	2-3 days
		3 weeks

UNIT I
MAKING OBSERVATIONS AND RECORDS OF WILDLIFE

INTRODUCTION

Proper management of wildlife and wildlife habitat depend upon careful and accurate observation and recording of activities that take place in the habitat and laboratory. Most all wildlife management depends upon the quality of information that is gathered and analyzed for accurate decisions to be made.

The purpose of this unit is to provide training for the advanced students in the techniques needed to properly obtain, record and store information related to wildlife management.

COMPETENCIES

To properly obtain, record and store wildlife information.

GENERAL PERFORMANCE OBJECTIVES/GOALS

Upon completion of this unit students should be able to:

1. Identify specific terms used in wildlife information recording.
2. Select proper methods for filing of wildlife field notes.
3. Select proper wildlife photographic record taking considerations.
4. Match instruments used in wildlife management with their use.

SPECIFIC PERFORMANCE OBJECTIVES AND MASTERY CRITERIA

1. Given a list of wildlife record keeping terms, students will be able to match the terms with the proper description with at least 75% accuracy.

2. Given a written exam dealing with taking and filing of field notes, students will be able to select proper methods with at least 75% accuracy.

3. Given a list of photographic record taking considerations, students will be able to select those that are proper with at least 75% accuracy.

4. Given a list of instruments used in wildlife management, students will be able to match each instrument and its proper use with at least 75% accuracy.

METHODOLOGY

A combination of methods can be used to teach this unit. Lecture and class discussion should be used to introduce the material to students. The instructor may then want to use field trips, planned laboratory exercise and resource persons to give students more experience and exposure to the topic.

SUGGESTED INTEREST APPROACHES

1. Plan a field trip to a wildlife area to practice observations.

2. Have a resource person speak to your class about methods used in recording information about wildlife.

3. Give a demonstration on recording information through the use of field notes and photography.

UNIT OUTLINE

I. Terms Used in Making and Recording Wildlife Observations

   A. Field notes

   B. Daily journal

   C. Special field forms

   D. Photographic field records

   E. Photographic laboratory records

II. Recording and Storing Observations

A. Making field notes

B. Filing field notes

III. Making Photographic Field and Laboratory Records

IV. Instruments Used in Wildlife Observation and Recording

A. Computer

B. Radio - location telemetry

C. Radar

D. Radioisotopes and their measurements

SPECIFIC PERFORMANCE OBJECTIVES AND LEARNING ACTIVITIES

OBJECTIVE 1. Given a list of wildlife record keeping terms, students will be able to match the terms with the proper description with at least 75% accuracy.

SUBJECT MATTER CONTENT

A. Terms and Definitions

1. Field Notes - records of wildlife observations made while working in the wildlife habitat that can be filed and retrieved for later use.

2. Daily Journal - a condensed "diary-type" entry of each day's activities that can be used in preparing monthly, quarterly, and annual project reports.

3. Special Field Forms - forms used to record specific types of data, such as trap records, vegetative surveys, food habits, hunting pressure and others.

4. Photographic Field Records - photographic records of field observations that would be difficult to record using written field notes.

5. Photographic Laboratory Records - photographic recording of biological specimens, laboratory techniques and other related matters, for future reference.

LEARNING ACTIVITIES

1. Discuss terms and definitions with the class.

2. Show examples of each type of wildlife record-keeping system to aid your discussion.

3. Prepare a list of terms and their definitions for your students.

OBJECTIVE 2. Given a written exam dealing with taking and filing of field notes, students will be able to select proper methods with at least 75% accuracy.

SUBJECT MATTER CONTENT

Distinguishing which wildlife observations are worth recording can be a major problem. Usually, the more detail we have in our records, the better. The most important item of consideration is that we do use some type of recording and filing of our observations. Our memory will never be as accurate as our recordings. The observation of what appears to be a trivial event in the field may direct attention at some later date to some phase of a problem. Items that should generally be recorded are predation, dead or diseased animals and other rare events that might happen. Recordings should contain as much detail as possible. Measurements of distances, weather conditions, marks on animals and locations of marks are generally good items to record. Field notes can be taken on any kind of note pad. However, 3 inch x 5 inch index cards that will fit in your pocket may be most useful.

Considerations in making field notes are as follows:

1. Always carry paper and a pen or pencil when entering a wildlife habitat.

2. Make your notes as soon as possible after the observation.

3. Include as much detail as possible.

4. Never rely on your memory for the recording of observations.

5. Rewrite your observations into a useful and readable form as soon as possible after you leave the wildlife habitat.

6. Use a uniform format for making field notes with a number given each observation.

7. Develop a filing system for your field notes.

8. File or record your field notes on a computer as soon as possible, before notes get lost.

9. Recorders can often be used to record observations that can later be converted into field notes.

A computer filing system may be one of the most practical and useful systems available for filing your field notes. A field note file classification system can be developed for your own needs. An example is Appendix A. Never include a "Miscellaneous" category, as a large amount of your field notes will be filed in this category. This often makes information difficult to use. Use a cross reference system as shown in Appendix B.

LEARNING ACTIVITIES

1. Take your students on a short pre-planned field trip to record one field note.

2. Have your students make a field note as a homework assignment. Discuss these field notes with the class.

3. Develop a field note filing system and have your students file their field notes in the system, with your guidance.

OBJECTIVE 3. Given a list of photographic record taking considerations, students will be able to select those that are proper with at least 75% accuracy.

SUBJECT MATTER CONTENT

Making photographs may often be one of the most accurate and useful methods of recording field observations, laboratory techniques and observations. Photographs may be reviewed at a later date to determine information that might not have been noticed in the initial observation.

Photographs or slides may also be useful in making presentations about wildlife management considerations. Most photos will need a limited amount of written information on file with them, if they are to provide a useful source of future reference.

Some considerations for producing photographs as wildlife information sources are:

1. Plan each picture carefully.
2. Get people or animals into the picture.
3. Avoid stiff, posed, photographs.
4. Make the photograph illustrate the point you have in mind.
5. Take pictures from several angles; film is the cheapest part of photo-taking costs.
6. Avoid long-range, panoramic shots; include close-ups, preferably within 6 to 8 feet.
7. To show scale, use a person or animal, avoid lifeless objects to show size.
8. Watch the background; remove such articles as cars, equipment, and other moveable objects.
9. Use additional lighting when natural light won't reveal the detail you desire.
10. Crop the picture to remove unwanted objects or harsh lighting effects.

LEARNING ACTIVITIES

1. Produce some photographs, or select photographs from publications, to develop a discussion about their use as wildlife information sources.

2. Demonstrate the proper procedures for recording information through the use of photography.

OBJECTIVE 4. Given a list of instruments used in wildlife management, students will be able to match each instrument and its proper use with at least 75% accuracy.

Instrumentation in wildlife management has become very popular during the past 50 years. Before instrumentation most all information was gathered through human observation, recorded by writing the information on cards and stored in files. Instrumentation has allowed us to obtain a greater amount of information and record as well as store it more efficiently.

Some of the instruments and their uses in wildlife management are as follows:

1. Computers - are used to record information obtained from human observations or from other sensing instruments used in wildlife management. Computers are also used in mathematical computations. They are especially useful in this area because they can handle large amounts of complex relationships rapidly, and allow for the study of these relationships.

2. Radio-Location Telemetry - is a technique for obtaining measurements on information about wildlife at a distance. The most common use of these instruments is to place a transmitter on wildlife that are being studied. Signals from the transmitter are observed with the use of a receiving system. This allows the observer the opportunity to locate an animal that is being studied at anytime. This type of observation allows the study of wildlife movements and migrations.

3. Radar - is a tool that can enable a wildlife biologist to watch the movements of flights of waterfowl simultaneously over a circular area greater than 100 miles in diameter, at all altitudes, thus adding to the understanding of the directions, form, and phenology of migration.

4. Radioisotopes and Their Measurements - Several types of radioisotopes are used in pesticide research to determine residues in tissues of

wildlife, and the excretion rates of these residues. Radioactive dating of fossils and biological materials, which is based on the ratios of various isotopes and known decay rates, has been useful in the study of geologic time.

LEARNING ACTIVITIES

1. Have a wildlife biologist speak to your classes about the use of instrumentation in wildlife management.

2. Take your class on a field trip to a wildlife management area to observe the use of instrumentation.

UNIT I TEST

Fill in the Blank: Using the following terms associated with wildlife record keeping, fill in the blanks below.

Field Notes	Photographic Field Records
Daily Journal	Photographic Laboratory Records
Special Field Forms	

1. _____ used to record field observations that would be difficult to record using written field notes.

2. _____ often used in preparing monthly, quarterly and annual project reports.

3. _____ used to record specific types of data.

4. _____ a condensed "diary-type" entry of each day's activities.

5. _____ records of biological specimens and laboratory techniques.

6. _____ records of wildlife observations made while working in the habitat.

True or False: T or F

7. _____ A tape recorder is generally of no use in making field notes.

8. _____ A computer can be used in your field note filing system.

9. _____ The fact that a bird is flying fast is generally a good item to put in field notes.

10. _____ Each field note should be numbered before filing.

11. _____ Most wildlife personnel rely on their memory for field notes until they get to their office to make written notes.

12. _____ Each photo should be carefully posed, as a source of wildlife information.

13. _____ Use long-range, panoramic shots when producing wildlife information photographs.

14. _____ To show scale, in wildlife information photography, use a person or animal.

15. _____ Cars and equipment should be removed from the background in wildlife photography.

16. _____ Never chop wildlife photographs, as it might remove useful information.

Matching:

17. _____ Computers

18. _____ Radio-Location Telemetry

19. _____ Radar

20. _____ Radioisotopes

a. often used in wildlife pesticide research

b. uses a transmitter and receiver

c. used to record, store and make calculations with wildlife information

d. used to watch the movements of waterfowl over a circular area

UNIT I TEST
ANSWER KEY

Fill in the Blank

1. Photographic Field Records
2. Daily Journal
3. Special Field Forms
4. Daily Journal
5. Photographic Laboratory Records
6. Field Notes

True or False (T or F)

7. F
8. T
9. F
10. T
11. F
12. F
13. F
14. T
15. T
16. F

Matching

17. c
18. b
19. d
20. a

UNIT I
EVALUATION AND TESTING

Ways to Evaluate Pupil Growth

Class participation
The students ability to demonstrate skills such as, taking field notes, photographic records and filing of records
Unit test

EQUIPMENT AND SUPPLIES

Students

Reference material
Notebooks

Teacher

Reference material
Pamphlets
Overhead projector
Transparencies

UNIT I
SUPPLEMENTARY MATERIALS

Inventory and Monitoring of Wildlife Habitat, Allen Y. Cooperrider, Raymond J. Boyd, and Hanson R. Stuart, 1986. U. S. Department of the Interior, U. S. Printing Office, Washington, D.C. 20402

Wildlife Conservation Employee; Agribusiness Training Program. Order number 0050.

Available From: Instructional Materials Service, F. E. Box 2588, Texas A&M University, College Station, Texas 77843-2588

Wildlife Management Techniques, Robert H. Giles, 1984. The Wildlife Society, Washington, D.C.

APPENDIX A

Field Note File Classification

Bats
Bear
Bibliography--Wildlife
Big Game--General
Birds--General

Chicken--Prairie
Conservation--Wildlife
Control--Wildlife
Coyote

Damage--Wildlife
Disease--Wildlife
Dogs
Dove
Deer
Ducks

Ecology
Economics--Wildlife

Fish--General
Fish Ponds
Feed and Cover--General
Foods--Food Habits
Forestry--General
Fox
Furbearers--General
Fur Farming

Grouse

Hawks and Owls
History--Wildlife

Insects

Laws--Wildlife

Livestock--Wildlife

Mammals--General
Management--Farm Game
Management--Forest Game
Management--Land
Mink
Muskrat

Opossum

Plants--General
Predation
Propagation

Quail

Rabbit
Refuges--Wildlife
Research--Wildlife
Restocking
Rodents

Skunk
Snakes
Soils
Squirrel

Techniques--Wildlife
Trapping
Turkey--Wild

Utilization--Wildlife

Waterfowl (other)
Weather
Woodchuck
Woodcock

Appendix B

A field note file on predation with cross references listed.

PREDATION

Also See Obs.

216 Coyote

222 Fox

318 Hawks and Owls

412 Fox

682 Livestock

776 Coyote

963 Trapping

1012 Livestock

UNIT II
HABITAT ANALYSIS AND EVALUATION

INTRODUCTION

Wildlife is a product of the land. The abundance and well-being of any animal population may be used as an indication of the productivity of the land, its misuse or both. The wildlife manager must be able to evaluate the habitat of any animal population he/she proposes to manipulate.

The purpose of this unit is to provide training in the basic techniques needed to analyze and evaluate the habitat of some species of wildlife.

COMPETENCIES

To successfully analyze and evaluate the habitat of some species of wildlife by gathering information through techniques learned in the classroom.

GENERAL PERFORMANCE OBJECTIVES/GOALS

Upon completion of this unit, students should be able to:

1. Define terms related to habitat analysis and evaluation.
2. List and describe the types of evaluations of habitat.
3. List the steps in appraising wildlife habitat.
4. Describe the conditions for farm game habitat.
5. Analyze and evaluate a plot of land for food production, availability, and consumption for a species.
6. Identify overstory, understory, and ground cover plants.

SPECIFIC PERFORMANCE OBJECTIVES AND MASTERY CRITERIA

1. Given a list of terms, students will be able to identify or give meaning to the terms with at least 75% accuracy.

2. Given a list of proper techniques used to analyze and evaluate the habitat of selected species of wildlife, students will describe each technique with 75% accuracy.

3. Students will list the steps in appraising wildlife habitat with at least 75% accuracy.

4. Given pictures of live plants, students will be able to categorize plants into overstory, understory, or ground cover with at least 75% accuracy.

5. Given a plot of land the students will access the land for food production, availability, and consumption for a given species.

METHODOLOGY

A combination of methods can be used to teach this unit. The instructor may incorporate field trips to reserves, woods, farms, and other areas of wildlife habitat. Also, resource people such as the wildlife manager may be utilized. Lecture and class discussion can be used to bring out procedures and techniques.

SUGGESTED INTEREST APPROACHES

1. Plan field trips to wildlife reserves.

2. Discuss with the class the importance of conservation of land for wildlife use.

UNIT OUTLINE

I. Terms

   A. Analysis

   B. Brood cover

   C. Browse

D. Cover

E. Cover maps

F. Density board

G. Escape cover

H. Evaluation

I. "Evaluation of wildlife habitat"

J. Food availability

K. Food consumption

L. Food production

M. Ground cover

N. Habitat

O. Mast

P. Nesting cover

Q. Ocular estimating

R. Overstory

S. Roosting cover

T. Understory

U. Wintering cover

II. Types of Habitat Analysis and Evaluation

A. Reconnaissance - type evaluation and evaluation

1. Cover density evaluation

2. Soil evaluation

3. Evaluation of food production, availability, and consumption

B. Vegetative analysis

C. Farm game habitat evaluation

D. Forest range evaluation

E. Evaluation of wetland habitat

III. Steps in Appraising a Wildlife Habitat

SPECIFIC PERFORMANCE OBJECTIVES AND LEARNING ACTIVITIES

OBJECTIVE 1. Given a list of terms, students will be able to identify or give meaning to the terms with at least 75% accuracy.

SUBJECT MATTER CONTENT

A. Terms and definitions

1. Analysis - observations of habitat as it has or does exist. A report of characteristics of habitat.

2. Brood cover - low lying vegetation such as grasses and forbs which afford protection for young game birds, usually quail and turkeys.

3. Browse - palatable twigs, shoots, leaves, and buds of woody plants. Terms often used to describe a category of deer foods.

4. Cover - a general term used to describe vegetation and topography. Cover requirements vary by species of wildlife. Types of cover are brood cover, escape cover, nesting cover, roosting cover, and wintering cover.

5. Cover maps - a map which shows the various types and the amount of vegetation.

6. Density board - used in measuring cover by obstruction to vision. This board also may be used to measure cover height up to 6 feet.

7. Escape cover - shrubby or herbaceous cover, hollow trees, water, or burrows that provide a means of getting away when harassed by predators.

8. Evaluation - an analysis plus value judgments made based on a set of human criteria.

9. Evaluation of wildlife habitat - intensive and extensive efforts to estimate or appraise the value of various segments of the environment for an animal population.

10. Food availability - designates the quantity of food within reach of the animal in question.

11. Food consumption - proportion of the available food which has been utilized by the animal species in question.

12. Food production - includes all food grown or synthesized in one growing season.

13. Ground cover - vegetation which grows closer to the ground than overstory and understory plants.

14. Habitat - the total environmental conditions of a certain area occupied by wildlife. Conditions include food, water, cover, disturbance, protection and people.

15. Mast - the fruit or nuts of such trees as oaks, beech, walnuts, and hickories. These are commonly referred to as hard mast. Soft mast is fruits and nuts of such plants as dogwood, viburnums, grape, huckleberry, crataegus, muscadine and blackberry.

16. Nesting cover - vegetation required by birds or animals to rear their young. Examples are tree dens for squirrels or grassy patches in or near openings for quail, turkey, or rabbits.

17. Ocular estimating - an estimate of cover which is done by the eye and put into a scarce, medium, or dense category.

18. Overstory - vegetation such as large trees.

19. Roosting cover - cover required by game birds. It ranges from idle fields or sparse timberlands for quail to cypress swamps for wood ducks.

20. Understory - vegetation which can grow under the overstory plants, such as tall shrubbery.

21. Wintering cover - all cover required by game to over-winter. It varies from trees with squirrel dens, to brush cover for quails, and honeysuckle patches for deer.

LEARNING ACTIVITIES

1. Discuss terms and definitions with the class.

2. Prepare a list of terms and their definitions.

OBJECTIVE 2. Given a list of proper techniques used to analyze and evaluate the habitat of selected species of wildlife, students will describe each technique with 75% accuracy.

SUBJECT MATTER CONTENT

A. Reconnaissance - Type Evaluation of Habitat

1. Cover Maps

a. Vegetation is the most important aspect of the environment for most forms of game animals. Cover maps are extremely useful for assessing vegetative habitat conditions.

b. Cover maps give a measure of the current habitat conditions so therefore, its value is limited to a short period of years.

c. A problem with cover mapping is how much detail should be included on the map. This problem can be solved by keeping the following factors in mind: (1) the use to be made of the map; (2) the area, or acreage; (3) the time available for mapping; (4) the principal animal species under consideration and (5) related factors.

d. Cover maps divide vegetative cover into three categories: (1) overstory, (2) understory, (3) ground cover.

2. Cover Density Evaluation

a. Symbols are used on cover maps to indicate cover density. These symbols are: - Scattered or light; = Medium; and ≡ Dense.

b. Techniques for evaluation of cover density include: (1) ocular estimation, (2) counting the number of stems per sample quadrant, (3) measuring the obstruction of vision, (4) measuring, by photoelectric devices, the influence of cover on exclusion of light, and (5) photography.

c. Ocular Estimating - Any experienced field worker can estimate the requirements of a specific wildlife species in regards to the amount of cover needed. The cover can be divided into one of three categories -- scarce, medium and dense.

d. Number of stems per sample plot - This procedure entails the counting of stems in a sample area.

e. Measuring obstruction of vision - This system indicates cover density by the use of a density board. The board is divided into 1 foot sections up to 6 feet tall. It is viewed at a distance of 66 feet. If there is no cover the reading is 21 (1, 2, 3, 4, 5, and 6 are added together); if cover completely obscures the entire board the reading would be 0. The table used in measuring obstruction of vision is as follows:

Percent Obscurity	Classification	Map Symbol
16	Scarce	-
33 to 66	Medium	=
66 and over	Dense	≡

f. Measuring cover density by photoelectric equipment - Another method used consists of taking various measurements taken in a certain plot of land which is being used by a certain species of wildlife which shows the amount of light being admitted through the overstory, understory, and ground cover. The rating of the cover density is as follows:

Percent of Light Admitted	Classification	Map Symbol
More than 75	Scarce	-
51 to 75	Medium	=
0 to 50	Dense	≡

3. Soil Evaluation

a. One of the most important evaluations that should be made in wildlife habitat analysis is soil evaluation. The type of soil that exists on a certain plat determines the nutritive value of plants which can be detected by wild animals. Published soil maps are the best source of information for such an evaluation. Another method of evaluating the soil is by a soil test which can be conducted by the state soil testing laboratory. Important things to remember about sampling soil are as follows: (1) use a clean bucket, send samples to laboratory in boxes provided by your county agent, S.C.S. technician, vocational agriculture teacher or other agriculture workers. Make sure to label, number, and address sample. (2) Take from 10 to 30 small samples from every part of the field, then combine the samples, and thoroughly mix. A composite sample should not be less than one quart of soil.

4. Evaluation of Food Production, Availability, and Consumption

a. Food Production - Criteria used in evaluating food production may be food quality, food plant variety, food requirement value, and the limiting food factor which is the lowest rating value for food criteria. Food production may be determined by the collecting of seed or other portions of plants from sample plots.

b. Food Availability - Any technique to determine food availability is time consuming and tedious. No single technique will supply data that will fully meet all needs for scientific range management. A different system of evaluating food availability must be used for different geographical regions.

c. Food Consumption - Data should be collected over a period of years in order to get the correct information. Key or browse species should be targeted and tagged in a certain area for study.

B. Vegetative Analysis

1. Reconnaissance appraisal of wildlife habitat may not meet all the needs of the wildlife manager, therefore vegetative analysis is required, which is a measure of one or more of the following:

   a. Presence/absence - of a given species in a given area.

   b. Basal area - the proportion of ground surface occupied by a species.

   c. Cover - vertical projection of above ground parts onto the ground.

   d. Frequency - expression of the percentage of sample plots in which a species occurs.

   e. Density - number of individuals per unit area.

   f. Dominance - effect of competition and environmental factors on the position occupied by a species in a stand.

   g. Importance - is a weighted expression to designate the value of a given plant for a given purpose. This expression may consist of a simple averaging of frequency, density, dominance.

C. Farm - Game Habitat Evaluation

Due to increasing human pressure on land the need for food and cover by wildlife is often acute. The habitat changes have greatly reduced population of some game species. Wildlife managers have considered the artificial improvement of wildlife habitat by the establishment of food and cover plants as one of the most effective approaches. Habitat development for wildlife may become generally acceptable when hunters are willing to make management of farmland profitable to landowners. Artificially established vegetation must be capable of permanent maintenance with little effort on the part of the landowner. A farm - game habitat should result in increased game populations and harvest. Farm - game habitat evaluation and use is a growing part of the Louisiana economy and will play an important part in the future of wildlife.

D. Forest Range Evaluation

Forest range condition requirements vary greatly for different species. Most species in forest or range in terms of food and cover basically determines the relative abundance of hoofed game. Besides food and cover other conditions such as precipitation, temperature, evaporation, and varying use patterns should be considered.

E. Evaluation of Wetland Habitat

Wetlands exceed all other land types in wildlife productivity. Wetlands are lowlands covered by shallow and sometimes temporary or intermittent waters including marshes, swamps, bogs, wet meadows, potholes, sloughs, and river - bottom lands. Wetlands are usually divided into purposes which are either breeding range for production purposes or wintering habitat. Taken into consideration also is the amount of cover on the wetlands. Density estimates were made on the ease with which ducks could penetrate it.

LEARNING ACTIVITIES

1. List and discuss the various types of evaluations and analyses of habitat.

OBJECTIVE 3. List the steps in appraising wildlife habitat with at least 75% accuracy.

SUBJECT MATTER CONTENT

A. Steps in Appraising a Wildlife Habitat

1. The following procedures describe the method for inventorying existing habitat conditions, rating the element criteria and calculating the habitat quality values.

Step 1: Determine the land users objectives and the practicability of managing on that operating unit.

Step 2: Select an area which will represent the home range. The home range area should be chosen, based not only on the animal requirements but also within the practical limits of how the landowner can effectively manage the area.

Step 3: Examine the home range area to assure that all the required elements are present.

Step 4: Evaluate each habitat element by matching conditions with the ratings prepared for the various criteria.

Step 5: Calculate the element values.

$$\text{Element values} = \frac{\text{element criteria ratings total}}{\text{number of element criteria}}$$

Step 6: Calculate the species habitat quality value.

$$\text{Habitat quality value} = \frac{\text{weighted or unweighted element value total}}{\text{number of habitat elements (adjusted for weightings)}}$$

Step 7: Assess what elements or criteria are weak or missing and plan practices to strengthen them accordingly.

LEARNING ACTIVITIES

1. Head a discussion on the various steps used in appraising wildlife habitat.

UNIT II TEST

Fill in the Blank: Using the following terms associated with habitat analysis, fill in the blanks below:

analysis	cover map	overstory
evaluation	density board	cover
ocular estimating	food consumption	habitat
ground cover	food production	understory
food availability	evaluation of wildlife	

1. _____ is the proportion of the available food which has been utilized by the animal species in question.

2. _____ designates the quantity of food within reach of the animal in question.

3. _____ includes all food grown or synthesized in one growing season.

4. _____ used in measuring cover by obstruction to vision.

5. _____ is an estimate of cover which is done by the eye and put into a scarce, medium or dense category.

6. _____ are observations of habitat as it has or does exist. A report of characteristics of habitat.

7. _____ is an analysis plus value judgments based on a set of human criteria.

8. _____ is intensive and extensive efforts to estimate or appraise the value of various segments of the environment for an animal population.

9. _____ show the various types and amounts of vegetation.

10. _____ used to describe vegetation and topography.

11. _____ vegetation such as large trees.

12. _____ vegetation which can grow under the overstory plants.

13. _____ vegetation which grows closer to the ground than overstory and understory plants.

14. _____ palatable twigs, shoots, leaves, and buds of woody plants.

True or False: T or F

____15. Vegetation is the most important aspect of the environment for most forms of game animals.

____16. A cover map's use may extend over a long period of years.

____17. One technique for evaluation of cover density is ocular estimation.

____18. The type of soil on a certain plot of land determines the nutritive value of plants.

____19. Any one technique used in determining food availability is sufficient.

____20. Habitat changes have greatly reduced the population of some game species.

____21. Farm game habitat is a growing interest in Louisiana.

Listing

22. List the five various types of habitat analysis and evaluation.

a.

b.

c.

d.

e.

23. List the following steps of appraising a wildlife habitat in sequential order.

a._____ Assess what elements or criteria are weak or missing and plan practices to strengthen them accordingly.

b._____ Determine the land users objectives and the practicability of managing on that operating unit.

c._____ Calculate the species habitat quality value.

d._____ Select an area which will represent the home range.

e._____ Calculate the species habitat quality value.

f._____ Examine the home range area to assure that all the required elements are present.

g._____ Evaluate each habitat element by matching habitat conditions with the ratings prepared for the various criteria.

Identification

Identify the following plants as overstory, understory or ground cover.

UNIT II TEST
ANSWER KEY

Fill in the Blank

1. food consumption
2. food availability
3. food production
4. density board
5. ocular estimating
6. analysis
7. evaluation
8. evaluation of wildlife habitat
9. cover maps
10. cover
11. overstory
12. understory
13. ground cover
14. browse

True or False (T or F)

15. T
16. F
17. T
18. T
19. F
20. T
21. T

Listing

22. a. Reconnaissance type evaluation of habitat

b. Vegetative analysis

c. Farm game habitat evaluation

d. Forest range evaluation

e. Evaluation of wetland habitat

23. a. Step 7

b. Step 1

c. Step 6

d. Step 2

e. Step 5

f. Step 3

g. Step 4

Identification

(Number and plants of choice)

UNIT II
EVALUATION AND TESTING

Ways to Evaluate Pupil Growth

Class participation
Unit test
Students' demonstration of skill of analyzing and evaluating a habit

EQUIPMENT AND SUPPLIES

Student

Reference material
Notebook

Teacher

Reference material
Pamphlets
Overhead projector
Transparencies
Plot of land for evaluation
Density board

UNIT II
SUPPLEMENTARY MATERIALS

Inventory and Monitoring of Wildlife Habitat. Allen Y. Cooperrider, Raymond J. Boyd and Hanson R. Stuart, 1986, U. S. Government Printing Office, Washington D.C. 20402.

Land Management Guide. Soil Conservation Service, Alexandria, Louisiana.

Life History Distribution, Food Habits and Habitat Requirements of Various Mammals. Debbie Moore, 1982, Soil Conservation Service, Alexandria, Louisiana.

Louisiana Conservationist Magazine (Back Issues). Department of Wildlife and Fisheries, P. O. Box 15570, Baton Rouge, Louisiana 70895.

Plan a Wildlife Management Program. Agricultural Science Student Materials, order number 8198.

Available From: Instructional Materials Service, F. E. Box 2588, Texas A & M University, College Station, TX 77843-2588

Wildlife Conservation Employee. Cooperative Training Course of Study, order number 0050.

Available From: Instructional Materials Service, F. E. Box 2588, Texas A & M University, College Station, TX 77843-2588

Wildlife Management Techniques. Robert H. Giles, 1984, The Wildlife Society, Washington D.C.

UNIT III
COLLECTION AND PRESERVATION OF BIOLOGICAL MATERIALS

INTRODUCTION

It is often important in wildlife management to preserve biological materials (plants and animals) that are found in the field. Most often this preservation is required to make comparisons, future study, and/or laboratory analysis of the biological material.

The purpose of this unit is to provide training in the preserving of biological materials for later use in wildlife management studies.

GENERAL PERFORMANCE OBJECTIVES/GOALS

Upon completion of this unit, students should be able to:

1. List methods used in the preservation of biological materials.
2. Select the proper type of preservation method for given biological materials.
3. Calculate the proper mixtures of chemicals for the preparation of preservation solutions.
4. List rules that should be followed in preserving diseased animals for laboratory study.
5. List methods used in preserving plant material.

SPECIFIC PERFORMANCE OBJECTIVES AND MASTERY CRITERIAS

1. Given a written exam, students will be able to list methods used in the preservation of biological materials with at least 75% accuracy.
2. Given types of biological material, students will be able to select the proper type(s) of preservation method with at least 75% accuracy.
3. Given a solution type needed for preservation of biological materials, students will be able to calculate the proper mixtures of chemicals to make the solution with at least 75% accuracy.

4. Given a written exam, students will be able to list the rules that should be followed in preserving diseased animals for laboratory study with at least 75% accuracy.

5. Given a written exam, students will be able to list methods used in preserving plant materials with at least 75% accuracy.

METHODOLOGY

A combination of methods can and should be used to teach this unit. The instructor can give demonstrations on the proper methods of preserving plant and animal materials. Resource persons and lecture, and class discussion can be used to bring out problems and procedures.

SUGGESTED INTEREST APPROACHES

1. Secure plant and animal specimens that can be viewed by your students to demonstrate uses of preservation.

2. Discuss with your class possible reasons for preserving of wildlife specimens.

3. Provide demonstrations of preservation methods for your students.

UNIT OUTLINE

I. Methods Used in Preservation of Biological Materials

   A. Refrigeration

   B. Freezing

   C. Fresh specimens

   D. Chemical preservatives

II. Selection of Preservation Methods

III. Formulation of Preservation Solutions

IV. Preserving Diseased Animals for Laboratory Study

V. Preservation of Plant Materials

A. Mounting plants

B. Plants preserved in solutions

SPECIFIC PERFORMANCE OBJECTIVES AND LEARNING ACTIVITIES

OBJECTIVE 1. Given a written exam, students will be able to list methods used in the preservation of biological materials with at least 75% accuracy.

SUBJECT MATTER CONTENT

Methods used in preservation of biological material to allow for additional study of the specimens:

1. Refrigeration - an excellent method of preserving materials that are to be held for a short period of time.

2. Freezing - a very popular and easy method of preservation. Freezing for a few days requires no special preparation of the specimen. However, preservation for longer periods of time will require the wrapping or placing of specimens in air tight containers to prevent loss of moisture. Any home type deep freezer can be used for storing specimens. However, care should be taken not to contaminate foods stored in a freezer. It is generally recommended to have a separate freezer for wildlife specimens that are to be preserved. Temperatures of approximately 0 degrees Fahrenheit are best for specimen storage.

3. Fresh Specimens - can often be preserved for sufficient lengths of time to obtain laboratory analysis of the specimen. The specimen should be placed in a watertight container and packed in a second container with either dry or natural ice surrounding the inner-most container. If dry ice is used the outer container should provide for ventilation to prevent a minor explosion due to sublimation of the dry ice. If natural ice is used the outer container should be waterproof.

4. Chemical Preservation - preservation most often used when the biological specimens will be preserved for a long period of time and will receive repeated observation and study.

LEARNING ACTIVITIES

1. Demonstrate methods of preservation to your students.

2. Show preserved specimens, representing each type of preservation, to your students.

OBJECTIVE 2. Given types of biological material, students will be able to select the proper type or types of preservation method with at least 75% accuracy.

SUBJECT MATTER CONTENT

A large number of chemical preservatives are available for general preservation of biological materials. Among those used are formaldehyde, ethyl alcohol, borax, and arsenic trioxide. Liquid preservatives are almost always superior to powders because they more thoroughly penetrate tissues. Most any type of plastic or glass container with a tight fitting top can be used for preserving of specimens in liquids.

A list of biological materials and the proper techniques for their preservation is provided in Appendix A.

LEARNING ACTIVITIES

1. Allow students to practice their skills at selecting proper preservation methods by giving them the name of a biological material and have them determine proper methods from Appendix A.

2. Discuss Appendix A with your students.

OBJECTIVE 3. Given a solution type needed for preservation of biological materials, students will be able to calculate the proper mixtures of chemicals to make the solution with at least 75% accuracy.

In Appendix A several concentrations of alcohol and formalin are required. When alcohol is stipulated in the appendix, reference is made to ethyl alcohol because methyl (wood alcohol) is not a satisfactory preservative. Normally, alcohol is 95% strength, and formaldehyde solution is 40% strength in commercial quality. The formula used in diluting either of these chemicals is as follows:

$$\frac{\text{Desired concentration} \times \text{desired volume}}{\text{concentration of stock solution}}$$

= Volume of stock solution to be diluted to desired volume

For example, suppose 300 ml of 70% alcohol is wanted and a stock solution of 95% alcohol is on hand.

Using the above formula:

$$\frac{70\% \times 300}{95\%} = 221 \text{ ml of } 95\% \text{ alcohol}$$

300 ml desired volume

- 221 ml 95% alcohol
79 ml of water needed to make solution of 300 ml

Likewise, 40% formalin is available to prepare 200 ml of 10% formalin. Then:

$$\frac{10\% \times 200}{40\%} = 50 \text{ ml of } 40\% \text{ formalin}$$

200 ml desired volume

- 50 ml 40% formalin
150 ml of water needed to make solution of 200 ml

LEARNING ACTIVITIES

1. Discuss the process of calculation with your class.

2. Allow students to practice their calculations and discuss each calculation after students have practiced.

OBJECTIVE 4. Given a written exam, students will be able to list the rules that should be followed in preserving diseased animals for laboratory study with at least 75% accuracy.

SUBJECT MATTER CONTENT

Caution should be taken in handling any animal where disease is suspected.

Rules that should be followed in handling suspected diseased animals for laboratory study are as follows:

1. Always be cautious of animals as the illness of the animal may cause illness in man.

2. Animals that appear to be healthy may be carrying infectious organisms.

3. Use gloves, respirator and protective clothing to handle dead and diseased animals.

4. Store and transport suspected diseased animals so that humans and other animals are not exposed to them.

5. A live diseased animal is of most value to the pathologist, as symptoms can better be observed.

6. Submit the entire carcasses for observation, if possible.

7. When tissues or organs are to be examined, select for obvious structural or function abnormalities; (tumors, abscesses, respiratory distress, etc.).

LEARNING ACTIVITIES

1. Lead a discussion on the rules with your class.

2. Provide possible diseased animal situations that your students can respond to, based upon the rules.

OBJECTIVE 5. Given a written exam, students will be able to list methods used in preserving plant materials with at least 75% accuracy.

SUBJECT MATTER CONTENT

The collection and preservation of good quality plant specimens is often very important to wildlife management. Plant specimens may be preserved for educational purposes, to obtain information from other sources and for yearly comparisons of plant growth.

Methods used in collecting and preserving good quality plant specimens are as follows:

1. Collect the entire plant (roots, stems, leaves and flowers if possible, but if this is impractical, select those portions of the plant which are needed for identification).

2. Clear roots of dirt.

3. Most specimens should be collected using:

   a. A portfolio which may consist of a number of folded sheets of paper 18 by 24 inches, or newspaper folded to 12 by 18 inches, placed between two pieces of heavy cardboard or slot frames and strapped together.

   b. A vasculum is a hinged top, oval-shaped, metal container measuring approximately 5 by 8 inches cross-section and 20 inches in length, equipped with a hinged door, 17 by 6 inches, and two metal rings for the attachment of a shoulder strap. Specimens are placed in the vasculum as they are collected in the field. Moist paper or damp moss is placed in the vasculum to keep the

specimens in fresh condition. Ex: a large plastic bag for each specimen.

4. Press the plant specimen as soon as possible after it is collected. A plant press is the same type of system as the portfolio as described earlier. However each folded paper containing a plant specimen is sandwiched with heavy felt paper for drying. The entire bundle is placed under pressure. The felt driers should be replaced after the first 24 to 26 hours of drying. The entire process is stored in a warm dry place.

5. Place only one kind of plant in a plant sheet.

6. Mount plants to white paper, 11 1/2 by 17 inches using white binding tape or plastic glue. The lower right-hand corner is reserved for the label of the specimen.

7. Store mounted specimens in tight boxes and protect from insect damage with a suitable fumigant.

8. Aquatic plants and other plants having a large mass of fleshy tissue are difficult to preserve by pressing and drying. Such specimens may be preserved by placing them in solution (See Appendix A).

LEARNING ACTIVITIES

1. Assist students in the collection and preservation of plant materials.

2. Provide some preserved plant specimens for student observation.

UNIT III TEST

1. List the methods used in the preservation of biological materials.

   a.

   b.

   c.

   d.

2. The instructor may select biological specimens for those in Appendix A and have students properly list techniques and chemicals used for each specimen.

3. How much 95% strength alcohol is needed to make 400 ml of a 35% strength solution?

4. How much water would be needed for a 10% formalin solution using a 40% strength formalin with a total volume of 200 ml?

5. List the rules that should be followed in preserving diseased animals.

   a.

   b.

   c.

   d.

   e.

   f.

   g.

6. List the methods used in collecting and preserving plant materials.

   a.

   b.

   c.

   d.

   e.

   f.

   g.

   h.

UNIT III TEST
ANSWER KEY

1. a. Refrigeration
   b. Freezing
   c. Fresh specimens
   d. Chemicals
2. Selected from Appendix A.
3. 147.37 ml
4. 150 ml of water
5. a. be cautious of animals, may cause illness to man
   b. use protective clothing and equipment
   c. animals that appear healthy may carry infectious organisms
   d. transport and store so humans are not exposed
   e. live diseased animals are most valuable to pathologist
   f. submit entire carcass for observation
   g. for tissue and organ examinations select obvious abnormalities
6. a. collect entire plant
   b. clear roots of dirt
   c. collect specimens in a portfolio, vasculum or large plastic bag
   d. press specimens soon after collection
   e. place only one plant on a sheet
   f. mount plants properly
   g. store mounts in tight boxes using fumigant
   h. preserve aquatic plants in solution

UNIT III
EVALUATION AND TESTING

Ways to Evaluate Pupil Growth

Class participation
Students demonstrating skills in collecting and preserving specimens
Unit test

EQUIPMENT AND SUPPLIES

Student

Reference material
Notebook

Teacher

Reference material
Overhead projector
Transparencies
Preserved plant specimens
Preserved animal specimens
Chemicals for preserving animals
Large plastic bags
Plant press
Paper and tape or glue for mounting plants

UNIT III
SUPPLEMENTARY MATERIALS

Plan a Wildlife Management Program. Agricultural Science Materials, order number 8198.

Available From: Instructional Materials Service, P. O. Box 2588, Texas A&M University, College Station, TX 77843-2588

Wildlife Conservation Employee. Cooperative Training Course of Study, order number 0050.

Available From: Instructional Materials Service

Wildlife Management Techniques. Robert H. Giles, 1986, The Wildlife Society, Washington, D.C.

APPENDIX A

Techniques Recommended for
Preservation of Biological Material

Biological Material	Recommended techniques, listed in order of preference
Mammals	
whole, small	Ethyl alcohol (70%) or 5% formalin
whole, large	Formalin (7-10%); also injection of preservative into internal organs by hypodermic-perfusion via circulatory route
Skins, pelts	(1) Clean thoroughly and air dry; (2) and salt thoroughly (NaCl); (3) use alum on pelts which appear to be "slipping"
Skins, study	(1) Borax (not to be used on skins having red pelage); (2) arsenic trioxide-borax mixture in equal proportions; (3) arsenical soap
Food material stomachs	Small stomachs-5% formalin; large stomachs-5-10% formalin (wrap stomachs in cheesecloth)
Droppings	Dry quickly, fumigate with carbon disulfide
Reproductive tracts	(1) AFA (preferably) or Bouin's fluid; (2) 10% formalin
Birds	
whole	(1) 70% alcohol; (2) 5% formalin, both with internal injection
Skins, pelts	(1) Borax; (2) arsenic-borax mixture
Stomachs	5% formalin
Droppings and pellets	Dry quickly and fumigate with carbon disulfide

Reptiles & Amphibians	
whole	(1) 35-40% isopropyl alcohol or 70% ethyl alcohol; (2) formalin-specimens should be slit or injected
Snake skins	Rolled flat, placed in 70% alcohol
Salamanders	Kill with chloretone or 20% alcohol; harden with 5% formalin and store in 70% alcohol
Amphibian skins (to preserve color)	Kill with ether; skin and place skin in water; float onto cardboard; dry quickly
Fish	(1) 70% alcohol; (2) 10% formalin
Insects	
Hard bodies	Kill with KCN bottle; store dry
Soft bodies	Kill and store in 5% formalin or 10% alcohol
Miscellaneous	
Skeletons-field	(1) Clean thoroughly and dry quickly; treat with arsenical soap for shipment; (2) place in alcohol (formalin, unless neutralized, dissolves calcium of bones)
Skeletons-in laboratory	(1) Boil gently in 3% hydrogen peroxide to remove meat and to bleach bones; degrease in carbon tetrachloride; (2) clean by use of dermestid beetles
Fumigants-for all specimens in pelt, study or standing mount form	Carbon disulfide as gas insecticide to kill insects; paradichlorobenzine as insect deterrent and DDT as insect contact killer
Pathological Material	
General	(1) Refrigerate (30-40 degrees F); (2) deep freeze and transport to laboratory as quickly as possible

Hematological	(1) Make several blood or tissue smears; (2) Blood serum; (3) cell counts: either sodium oxalate 2-4 mg/ml or sodium citrate 2-4 mg/ml; refrigerate; (4) whole blood or serum dried on paper discs
Bacteriological	(1) Refrigerate entire specimens; (2) take blood, pus or fluids in sterile containers; refrigerate; (3) saturate cotton swabs with blood, pus, or tissue juices; transport in special medium; (4) make smears from blood, serous fluids, tissue juices
Virological	
Rabies	If possible confine the animal and wait until death occurs. Refrigerate and rush the head (if possible the entire carcass) to Public Health Laboratory
Other Viruses	(1) refrigerate; (2) freeze; (3) put 1 cm. cubes of tissue in glycerol
Parasitological	
Ectoparasites	Remove by hand or with aid of ether, chloroform or sorptive silica powder (Dri Die). (1) ship live in non-airtight container with moist cotton, refrigerate if possible. (2) kill with ether, chloroform or HCN and ship dry between layers of cotton. (3) freeze and ship frozen.
Helminths	(1) relax in cold water. Fix nematodes in hot 70% alcohol. Fix cestodes, trematodes in warm AFA. (2) alcohol 70%-95 parts glycerol-5 parts
Protozoa	(1) refrigerate tissues, feces, citrated blood (2) make smears of blood, feces, tissue impressions (3) fix tissues in 10% formalin

Histological	Fix small pieces of tissue in 10% formalin (10-20 X volume of tissue) Do not freeze.
Toxicological	Refrigerate or freeze blood, liver, kidneys, brain, stomach with contents, small intestine.
Plants	
Terrestrial	Place between folded paper, dry quickly between corrugated cardboards and with slight pressure in plant press
Aquatics, or other plants with a mass of tissue	(1) alcohol-acetic acid-formalin solution; (2) 2 to 4% formalin

UNIT IV
WILDLIFE POPULATION ANALYSIS

INTRODUCTION

Wildlife population is a vital link to one of the state's largest industries. Sportsmen and commercial hunters alike rely heavily on proper management decisions for an abundance of wildlife. Millions of dollars are pumped into the economy each year at the expense of wildlife. Therefore, management of wildlife is necessary to maintain proper numbers due to increased pressure from man and environment.

Animal population analysis means the process of attempting to determine the number, age, and sex of a population. Predictions are difficult but estimates are vital to future generations of wildlife. The basic ingredients needed for a population study are birth and death rates, age, sex and abundance.

The Louisiana Wildlife and Fisheries Department has devised population evaluation methods which will be discussed in this unit. The purpose of this unit is to give students methods used by the Department for population analysis. The many and diverse schemes for estimation of population numbers could fill several volumes, therefore, studies will be confined to the most popular wildlife species in Louisiana.

COMPETENCIES

To gain knowledge and experience in procedures used to determine populations of various wildlife.

GENERAL PERFORMANCE OBJECTIVES/GOALS

Upon completion of this unit students should be able to:

1. Explain the procedures used to determine wildlife populations.
2. Make or study a wildlife survey.
3. Analyze the survey.
4. Make management decisions to maintain proper wildlife populations.

5. Have a good understanding of the importance of all wildlife surveys.

6. Identify popular wildlife of Louisiana.

SPECIFIC PERFORMANCE OBJECTIVES AND MASTERY CRITERIA

1. Given a small and well defined wooded area, students will conduct the drive count method and determine deer population with at least 75% accuracy.

2. Given a deer range survey report, students will make management decisions and recommendations with at least 75% accuracy.

3. Given waterfowl inventory data sheets, students will complete combined transect totals and waterfowl forms with at least 75% accuracy.

4. Given a fur animal census sheet, students will recommend management procedures conducive to the area with at least 75% accuracy.

5. Given an alligator survey sheet and tally sheets with hypothetical figures, students will properly complete the survey with at least 75% accuracy.

6. Given a bobwhite survey report, students will analyze results and make recommendations with at least 75% accuracy.

METHODOLOGY

A combination of methods must be used to teach this unit effectively. Classroom discussions, films and other visual aids should be used for the introduction of this unit. Resource persons from the Department of Wildlife and Fisheries with the incorporation of a field trip would be interesting and helpful. An actual survey should be made. Photos of wildlife should be displayed on bulletin board.

SUGGESTED INTEREST APPROACHES

1. Discuss with class the importance of wildlife to Louisiana.

2. Show a wildlife film.

3. Use resource persons (Biologists or Wildlife Conservationists).

4. Plan a field trip.

5. Conduct a population study.

UNIT OUTLINE

I. Drive Count for Deer

   A. General information

   B. Illustration of technique

II. Deer Range Survey

   A. General information

   B. Deer range survey report

III. Aerial Waterfowl Population Analysis

   A. General information

   B. Survey reports

IV. Fur Animal Census

   A. General information

   B. Survey report

V. Alligator Survey

   A. General information

   B. Survey report

VI. Bobwhite Fall Whistling Survey

   A. General information

   B. Survey reports

SPECIFIC PERFORMANCE OBJECTIVES AND LEARNING ACTIVITIES

OBJECTIVE 1. Given a small and well defined wooded area, students will conduct the drive count method and determine deer population with at least 75% accuracy.

SUBJECT MATTER CONTENT

Drive-counts are used frequently to determine deer population, yet the technique is variable and modified by the particular area. Two crews of observers are needed, one to drive and a second to monitor population. A suitable area should be chosen, possibly one bound by roads, pipelines, etc.

Example of Method: Monitors will be stationed reasonably apart and observed in same direction. As deer leave the area, a count is made and counts are discontinued as soon as the drive crew has passed. By looking in one direction, this ensures one and only one observer tallying each animal. Drive lines should be kept close together. Tallies are made by animals passing through the line only to his right (or left) between himself and the next person. (See Illustration A, page IV-13.)

LEARNING ACTIVITIES

1. Class discussion of deer drive.
2. Field trip and actual survey.
3. Analysis of study.

OBJECTIVE 2. Given a deer range survey report, students will make management decisions and recommendations with at least 75% accuracy.

SUBJECT MATTER CONTENT

Last year (1987), 82 hunting clubs across the state participated in the Intensive Deer Management Program. Over 300,000 acres of hunting area was involved in the surveys. Surveys were taken after the hunting season were closed for best results.

In making the actual survey, wildlife specialists sampled representative areas of each lease. Many variables are involved in making each survey. Some of the most important factors of a survey are:

1. Degree of browse of palatable and unpalatable plants.

2. Availability of preferred deer browse plants.

3. Extent to which plant is eaten.

4. Types of Areas - logged recently, understory, hardwoods, canopy and others.

For complete deer range survey see Appendix A (page IV-13) and Appendix B (page IV-14).

After each range survey is completed, a club survey is conducted to determine total number of deer harvested, etc. Jawbones are collected to determine age of deer. Wildlife biologists are now able to make future recommendations so that hunting clubs will manage their game properly.

LEARNING ACTIVITIES

1. Class discussion of the survey.

2. Identification of plants palatable to deer (plant samples).

3. Resource person from Wildlife and Fisheries.

4. Application of technique in a small controlled wooded area.

OBJECTIVE 3. Given waterfowl inventory data sheets, students will complete combined transect totals and waterfowl survey forms with at least 75% accuracy.

SUBJECT MATTER CONTENT

Aerial Waterfowl Population Analysis

An aerial survey is conducted annually in September by the Louisiana Department of Wildlife and Fisheries. The State is divided into five classes, each class representing a particular area, they are: (1) Class I - Marsh Land, (2) Class II - Fresh Water, (3) Class III - Brackish Water, (4) Class IV - Intermediate, (5) Class V - Other.

The wildlife survey takes about three days tc complete. The system is quite basic consisting of one pilot and two observers. The state is divided into two zones -- an East and West. Lines are drawn North-South on an aerial map. The West zone has intervals of 7.5 miles (17 West transect lines) and East zone has intervals of 15 miles (10 east transect lines). The plane travels 100 m.p.h. at an altitude of 125 feet. Wildlife specialists are trained intensively to recognize species of ducks with a high degree of accuracy. As area is being observed, information is recorded on tape. The information is transposed the same night (Appendix C). All information is recorded on combined transect totals (Appendix D). The totals observed are now multiplied (West index 35.1) (East index 72.7) to get an estimated number for each species (See Appendix E and Appendix F - Total).

Note: All Appendices represent actual survey conducted by Louisiana Wildlife and Fisheries Department.

LEARNING ACTIVITIES

1. Class discussion of the aerial survey.
2. Resource person from Wildlife and Fisheries.
3. Identification of waterfowl.
   a. Film or other visual aids.
   b. Pictures from Louisiana Conservation Magazine.

4. Filling out forms.

5. Analysis of survey made by the Department (Appendix C - F).

6. Field trip to Rockefeller.

OBJECTIVE 4. Given a fur animal census sheet students will recommend management procedures conducive to the area with at least 75% accuracy.

SUBJECT MATTER CONTENT

Fur animal censuses are conducted to determine the population of bobcat, fox and coyote; however, all fur-bearing animals are estimated since information is available. Fur animals are of great importance to the economy of South Louisiana, therefore it is vital to predict current populations and trends.

To conduct the survey, the state is divided into 26 lines running approximately 50 miles each. Scent post attractants are placed strategically at one mile intervals. A scent post consists of fatty acids which are anchored to the ground in areas near openings, water holes, etc. Wildlife specialists are trained to recognize animal tracks from which counts are tallied. All information received is recorded on the fur animal census (See Appendix G, page IV-24).

LEARNING ACTIVITIES

1. Class discussion of fur animals.

2. Identification of fur-bearing animals in Louisiana.

3. Resource person from Wildlife and Fisheries.

4. Actual survey in the area.

OBJECTIVE 5. Given an alligator survey sheet and tally sheets with hypothetical figures, students will properly complete the survey with at least 75% accuracy.

SUBJECT MATTER CONTENT

The alligator is quickly becoming a major part of the state's economy. Alligator populations have soared over the years due to intense protection and management programs conducted by the Wildlife and Fisheries Department. Alligator farms are also on the increase in South Louisiana.

Since alligator meat and hides are in high demand, they must be monitored closely by officials. Surveys are made frequently to assure an ample population for the future. The survey consists of one man operating a boat, one man shining a light, and one man recording. All surveys are conducted at night since this is their most active period. The size of an alligator is determined by the distance between the tip of nose to the eyes. Experts estimate this distance and convert into feet (Example 6" = 6 foot alligator). All information is recorded on tally sheets and diagnosed for future implementation of the hunting seasons (See Appendix H, page IV-26 and Appendix I, page IV-27).

LEARNING ACTIVITIES

1. Class discussion of the alligator industry.
2. Film or other visual aids.
3. Resource person from Wildlife and Fisheries or a commercial farmer.
4. Field trip to a commercial farm.

OBJECTIVE 6. Given a bobwhite survey report, students will analyze results and make recommendations with at least 75% accuracy.

SUBJECT MATTER CONTENT

Bobwhite populations in Louisiana have declined since the turn of the century, and are now perceived to be at all-time lows. Farmlands offer marginal to very poor habitat quality; however, it has always supported the greatest number of bobwhites. Presently, pinelands support the majority of

bobwhites and offer the greatest recreational opportunities. The bobwhite population has been on the decline due largely to more productive and clean farmlands and intensively improved pastures and grazing. Documentation is needed to better understand bobwhites, their habitats and to develop a program for better management practices.

Surveys are conducted in the fall of the year. These surveys are utilized to forecast hunter success and answer many important questions.

A fall whistling count was initiated in Louisiana on the Ft. Polk WMA in 1977. The results of this study seemed to reflect the population trend and hunter success for that region. In 1983 the fall whistling survey was expanded as a statewide survey (LDWF unpublished data).

In making the survey, the state is divided into 5 habitat types: longleaf pine, mixed shortleaf and loblolly pine-hardwood, loblolly pine (Florida Parishes), the rice belt, and Mississippi/Atchafalaya agriculture belt. The state is divided into 49 routes in which all habitat areas were surveyed. The starting points are randomly selected and plotted on maps. Whistling is started at the starting points with intervals of approximately 1 mile. Electronic callers are used for responses. Whistling counts begin 1/2 hour before sunrise and finish 1 1/2 hour afterwards. Each whistling sequence call is 3-2-3-2-6-6 with a listening period of 10 seconds. Routes which do not give responses are discontinued after 3 consecutive years of 0 responses (See Appendices J, pages IV-28 to L, pages IV-30).

LEARNING ACTIVITIES

1. Class discussion of bobwhite whistling survey.
2. Field trip and actual survey.
3. Resource persons.
4. Analysis of a study.

UNIT IV TEST

Student evaluation for this unit should not be based on a written test. It is suggested that the following exercises be completed for a proper understanding of this unit.

1. Collection of wildlife photos by students to identify waterfowl, fur bearing animals, deer, quail and alligator common to Louisiana.

2. Written theme to be presented in class concerning the importance of wildlife to Louisiana.

3. Field trip to Rockefeller Refuge in Cameron parish.

4. If possible, an actual survey with the assistance of a hunting club and local wildlife agent.

5. Classroom practice in using the survey forms that are provided in the appendices.

UNIT IV
EVALUATION AND TESTING

Ways to Evaluate Pupil Growth

Class participation
Written report
Field trip participation
Accuracy of completing survey forms

EQUIPMENT AND SUPPLIES

Student

Photos of Louisiana wildlife
Theme
Survey reports

Teacher

Resource person
Pamphlets from Department of Wildlife and Fisheries
Films and other visual aids

UNIT IV
SUPPLEMENTARY MATERIALS

Estimating the Number of Animals in Wildlife Populations. Chapter 21 and 22.

Available from: W. Scott Overton, Professor - Department of Statistics, Oregon State University, Corvallis, Oregon.

Inventory and Monitoring of Wildlife Habitat. Allen Y. Cooperrider, Raymond J. Boyd and Hanson R. Stuart, 1986. U. S. Government Printing Office, Washington D.C. 20402.

Louisiana Conservationist Magazine, (Back Issues). Department of Wildlife and Fisheries, P. O. Box 15570, Baton Rouge, Louisiana 70895.

Pamphlets - from the Department of Wildlife and Fisheries - local area.

Wildlife Films - Parish Library or Local Wildlife and Fisheries Department.

APPENDIX A

DEER RANGE SURVEY

Date: _____ Surveyed By _____ District _____

Parish(es) _____ WMA or Hunting Club: _____

RANGE (VEGETATIVE) TYPES

Percent occurring in unit

(1) Loblolly - shortleaf pine-hdwds.(pine/hdwd. ratio _____); _____

(2) Mixed hdwds. (Bottomland hdwds.____ Upland hdwds. _____); _____

(3) Cypress - Tupelo (Swamps & Brakes); _____

(4) Other: _____ _____

(In the following show information by type; identify by showing the number of that type)

TYPE NO. _____ Canopy: Dense ___ Mod. Dense ___ Sparse___; Major Species (in order of higher occurrence): _____

Understory: Dense ___ Mod. Dense ___ Sparse ___; Major Species (in order of higher occurrence): _____

General availability of preferred deer browse plants: High ____ Mod. ____ Low ____

Major browse species in order of higher occurrence and degree of browse usage:
Low (L) 0-30%; Mod. (M) 30-50%; High (H) 50%+ _____

_____

Non-preferred species used and degree of usage _____

_____

Percent of forest stand in: Regeneration ___ Pulpwood ____ Small Saw Timber ____ Larger Logs ____.

Major forest management goals appear to be for Pulpwood ____ Logs ____ Other ____

TYPE NO. ____ Canopy: Dense ___ Mod. dense ___ Sparse ___; Major Species (in order of higher occurrence): _____

Understory: Dense ___ Mod. Dense ___ Sparse ___; Major Species (in order of higher occurrence): _____

General availability of preferred deer browse plants: High ____ Mod. ____ Low ____

Major browse species in order of higher occurrence and degree of browse usage:
Low (L) 0-20%; Mod. (M) 30-50%; High (H) 50%+ _____

_____

Non-preferred species used and degree of usage _____

_____

Percent of forest stand in : Regeneration ___ Pulpwood ___ Small Saw Timber ___ Larger Logs ___.

Major forest management goals appear to be for Pulpwood ___ Logs ____ Other ____

APPENDIX B

(The following is a summation for all types in the entire survey area)

Major land use _____ Density of Settlement High ___ Mod ___ Low ___
Evidence of cattle _____ hogs ____ Other ____ No livestock was noted _____
Adverse livestock effect on the range is High ____ Mod. ____ Low ____ None ____
Evidence of free ranging dogs is High ____ Mod. ____ Low ____ None ____
The major natural adverse factors (floods, etc.) are _____
Indications are that illegal hunting has a High ____ Mod. ____ Low ____ impact on the herd.
Deer damage to forest ____ agriculture ___ is: (Enter High, Mod., Low or None. _____
It had been _____ days since last rain and tracking surfaces were good ____ fair ____ poor ____.

Evidence of other deer sign observed is shown below:	High	Mod.	Low
Sets of fresh tracks	____	____	____
Sets of older tracks	____	____	____
Well defined travel trails	____	____	____
Recent and older droppings	____	____	____
Buckrubs	____	____	____
Other	____	____	____

This unit or portion surveyed supports a High ___ Mod. ___ Low ___ deer herd and the range is good ____ fair ____ poor ____. Forest management and/or herd conditions indicate that in the next five years the range can be expected to improve ____ remain at least adequate ____ decline ____.

To make this herd compatible with carrying capacity of the range while also providing maximum harvest of annual surplus production of deer, there needs to be more ____, same ____, less ____ legal harvest which can best be provided by more ____, same ____, less ____, either-sex hunting and longer ____ same _____ shorter ____ general seasons.

Other recommended season and/or harvest needs: _____

_____

REMARKS: _____

_____

_____

_____

_____

LOUISIANA WATERFOWL INVENTORY DATA SHEETS

Transect line #

Observers

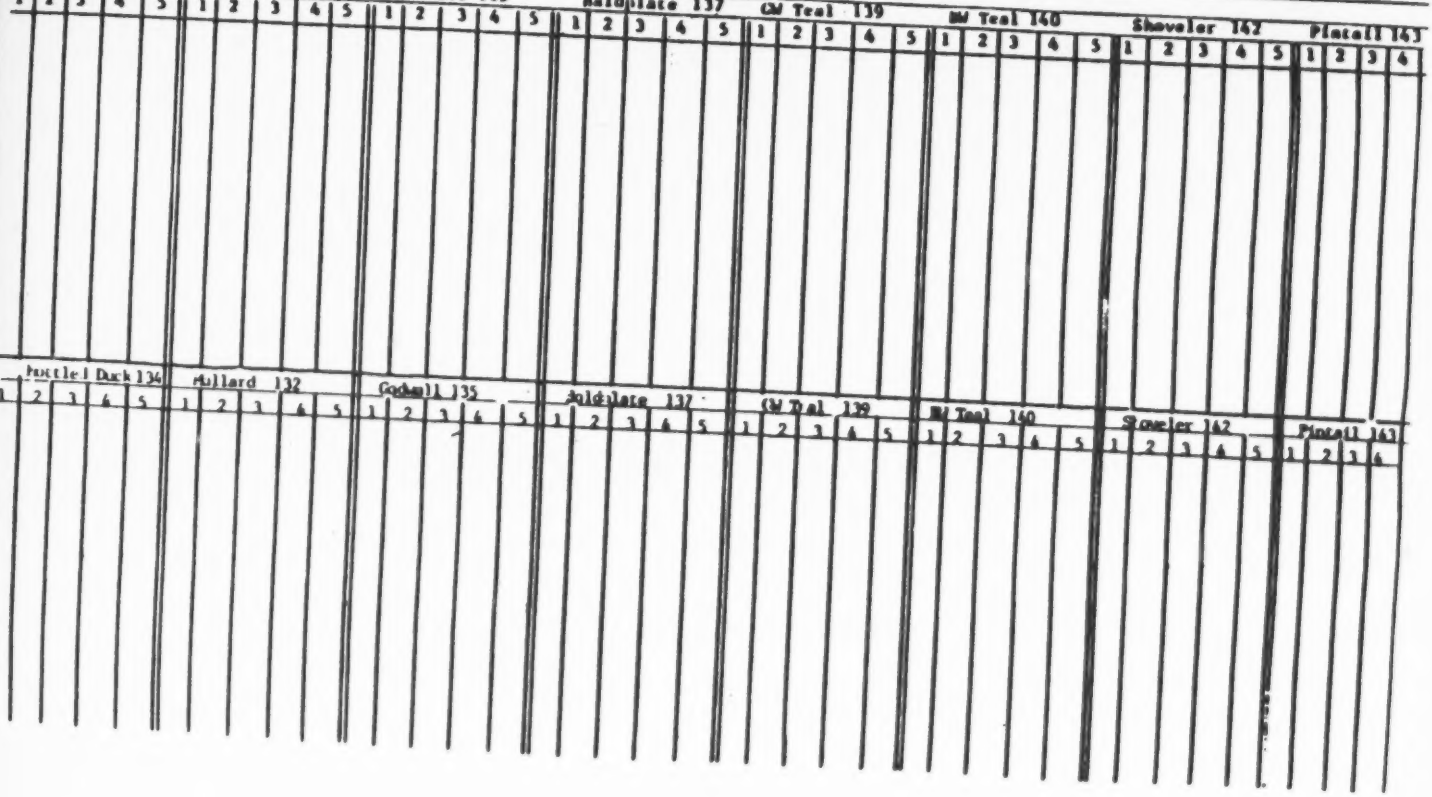
Date

Time

Remarks

Visibility Conditions

Wind



Mottled Duck 134
Mallard 132
Gadwall 135
Baldplate 137
GW Teal 139
BW Teal 140
Shoveler 142
Pintail 143
1 2 3 4 5

BEST COPY AVAILABLE

LOUISIANA WATERFOWL INVENTORY FIELD DATA SHEET

Transect line # | Date | Time | Visibility Conditions | Wind

Observers | Remarks

Coots 221					Ring-necked 150					Scaup 149					Hooded Merganser 131					Blue-Snow 169					White-fronted 171					Canvasback 147				
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

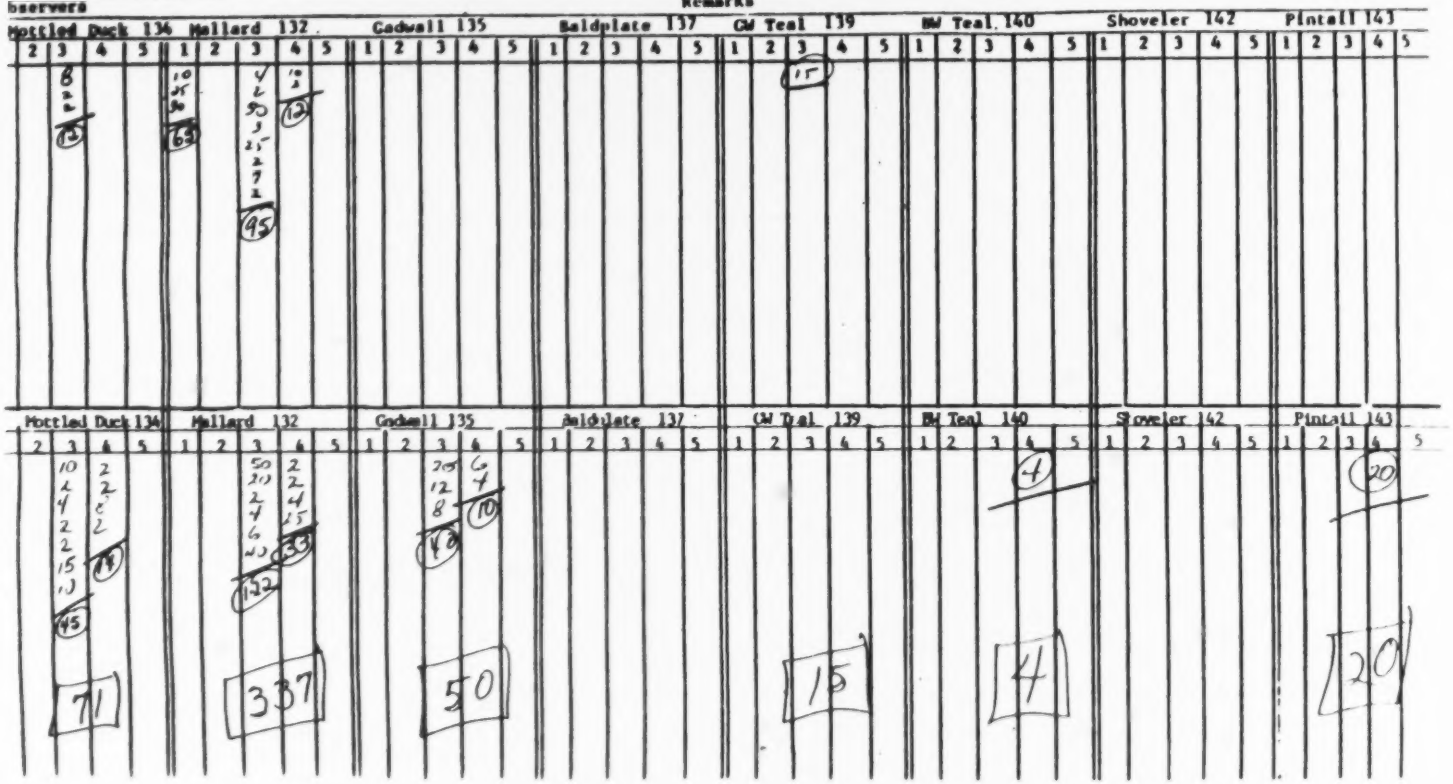
APPENDIX C

LOUISIANA WATERFOWL INVENTORY DATA SHEETS

Transect line # 1 N-S Date 1-5-88 Time 8:05 - 8:11 Visibility Conditions Clear Wind NE 10-15

Observers

Remarks



COMBINED TRANSECT TOTALS

DATE: _____ OBSERVERS: _____

PILOT: _____

NSECT #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	TOTAL SW	18	19	20	21	22	23	24	25	26	27	TOTAL SI
LARD																													
TLED																													
WALL																													
DPLATE																													
TEAL																													
TEAL																													
VELER																													
TAIL																													
TS																													
UP																													
G-NECKED																													
DED MERG																													
VASBACK																													
. Sw.																													
Teal																													

BEST COPY AVAILABLE

COMBINED TRANSECT TOTALS

DATE: 11/5/88

OBSERVERS: _____

PILOT: _____

TRANSECT #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	TOTAL SW	18	19	20	21	22	23	24	25	26	27	TOTAL SI
MALLARD	337	140	376	96	154	2	741	524	451	175	475	194	520	236	14	25	21	9112	210	110	402	424	102	111	40	16	12	-	1457
MOTTLED	71	40	23	12	37	4	182	20	72	44	34	55	122	16	26	62	12	443	—	—	57	68	46	54	104	82	78	16	504
GADWALL	50	1417	70	120	144	46	338	731	271	578	331	159	426	404	138	57	14	6425	50	42	220	321	69	112	171	184	654	325	4850
WIGEON	—	702	2	112	14	—	141	22	54	50	170	50	70	15	15	14	—	1568	8	40	310	47	—	12	—	1	55	148	642
GREEN-WINGED TEAL	45	475	267	458	80	450	413	178	39	60	125	227	304	62	254	191	80	5335	75	112	248	150	—	12	44	116	140	112	1627
BLUE-WINGED TEAL	4	5	820	22	4	—	194	—	21	10	12	131	56	10	—	20	—	1164	65	10	98	24	12	59	—	339	10	55	937
SHOVELER	—	65	91	100	5	—	255	124	174	27	301	117	113	20	—	11	10	2534		—	170	5	15	31	—	21	14	62	311
PINTAIL	22	462	246	455	404	33	360	140	169	170	64	78	777	50	—	7	2	4706		76	45	113	11	62	18	—	—	791	1214
MALLARD	—	450	184	560	45	17	428	40	90	135	25	—	545					4339		90				3430				542	3855
SCAUP			35	10				200				4						239			45	15	1077	691	400		1250	104	3519
RING-NECKED			456	142	18	22	44	359		1		4		401				2719			53		1	1454			3	55	372
HOODED MERG				9						13				2			—	26											
CANVASBACK														125				125											
Other Species			2449	140	450						1000							2589											
Waterfowl	27		27	25	150			2										4.4			10								10

APPENDIX E

SCRATCH SHEET
LOUISIANA WATERFOWL SURVEY

DATE:_____

	SW SURVEY AREA (35.1)		SE SURVEY AREA (72.7)	
	OBSERVED*	ESTIMATED	OBSERVED*	ESTIMATED
MALLARD				
MOTTLED				
GADWALL				
WIGEON				
GW TEAL				
BW TEAL				
SHOVELER				
PINTAIL				
COOTS				
SCAUP				
RING-NECKED				
CANVASBACK				
HOODED MERGANSER				

*NUMBER EST SEEN ON TRANSECT LINES IN THIS SURVEY AREA

APPENDIX E

SCRATCH SHEET
LOUISIANA WATERFOWL SURVEY

DATE: 1/7/88

	SW SURVEY AREA (35.1)		SE SURVEY AREA (72.7)	
	OBSERVED*	ESTIMATED	OBSERVED*	ESTIMATED
MALLARD	9112	319,831	1,457	105,923
MOTTLED	943	33,099	509	37,004
GADWALL	6,423	225,447	4,850	352,595
WIGEON	1,568	55,036	642	46,673
GW TEAL	5,335	187,258	1627	118,282
BW TEAL	1,651	57,950	737	68,119
SHOVELER	2,531	88,838	311	22,609
PINTAIL	4,706	165,180	1214	88,257
COOTS	4339	152,298	2855	207,558
SCAUP	239	8,388	3375	245,362
RING-NECKED	2719	95,436	372	27,044
CANVASBACK	125	4,387	~~X~~	~~X~~
HOODED MERGANSER	26			—

*NUMBER EST SEEN ON TRANSECT LINES IN THIS SURVEY AREA

APPENDIX F

POST OFFICE BOX 15570
BATON ROUGE, LOUISIANA 70895

Waterfowl Populations Estimates in Louisiana's Coastal Zone Below U. S. Hwy. 90 and on Catahoula Lake.

DATE: _____

REPORTED BY: _____

_____

PILOT: _____

Estimates Made From Aircraft (*) Estimate Less Than 1,000

SPECIES	SOUTHWEST	SOUTHEAST	CATAHOULA LAKE	TOTALS
MALLARD				
MOTTLED				
GADWALL				
WIGEON				
GW TEAL				
BW TEAL				
SHOVELER				
PINTAIL				
TOTAL DABBLERS				
SCAUP				
RINGNECKED				
CANVASBACK				
TOTAL DIVERS				
TOTAL DUCKS				
COOTS				

COMMENTS:

APPENDIX F

LOUISIANA DEPARTMENT OF WILDLIFE AND FISHERIES
POST OFFICE BOX 15570
BATON ROUGE, LOUISIANA 70895

Waterfowl Populations Estimates in Louisiana's Coastal Zone Below U. S. Hwy. 90 and on Catahoula Lake.

January 13, 1988

DATE: January 5-6, Catahoula Lake January 11, 1988

REPORTED BY: Robert Helm, Dave Morrison, Jimmy Emfinger

PILOT: Bruce Stamey

Estimates Made From Aircraft (*) Estimate Less Than 1,000

SPECIES	SOUTHWEST	SOUTHEAST	CATAHOULA LAKE	TOTAL
MALLARD	320,000	106,000	2,000	428,0
MOTTLED	33,000	37,000	---	70,0
GADWALL	226,000	353,000	*	579,0
WIGEON	55,000	47,000	*	102,0
GW TEAL	187,000	118,000	4,000	309,0
BW TEAL	58,000	68,000	*	126,0
SHOVELER	89,000	23,000	*	112,0
PINTAIL	165,000	88,000	1,000	254,0
TOTAL DABBLERS	1,133,000	840,000	7,000	1,980,0
SCAUP	8,000	245,000	4,000	257,0
RINGNECKED	95,000	27,000	14,000	136,0
CANVASBACK	4,000	*	78,000	82,0
TOTAL DIVERS	107,000	272,000	96,000	475,0
TOTAL DUCKS	1,240,000	1,112,000	103,000	2,455,0
COOTS	152,000	208,000	25,000	385,0

COMMENTS:

Recent precipitation associated with cold fronts has provided an abundance of wet habitat in the coastal zone and in agriculture areas throughout the State. Waterfowl were widely dispersed over this improved and abundant habitat.

The estimate of total ducks remained basically unchanged since mid-December with a general reduction in dabblers (with the exception of mallards) offset by an increase in divers. This is the largest mid-winter mallard estimate within the coastal zone since 1981. The extremely cold weather to the north has evidently forced many mallards to the coast. Pintail estimates remain comparably low. The number of scaup estimated in the southwest zone continued to be low; however, one of the largest concentrations ever noted was present in unsurveyed coastal waters off Vermilion Parish. Scaup were observed continuously for 7 nautical miles and extended up to 4 miles off shore. A separate scaup survey on Lakes Ponchartrain and Borgne indicated 188,000 scaup last week compared to 338,000 in mid-December. The number of canvasbacks on Catahoula Lake during this survey is one of the largest on record. (Continued)

APPENDIX G

FUR ANIMAL CENSUS

FIELD DATA SHEET

DATE: 10 (Mo.) 20 (Day) 1987 (Yr.) Region Number: _____ Line Number: _____

Observer: Sturgis 4387

Habitat Types

1.- Bottom land hardwood
2.- Mixed pine-hardwood
3.- Pure pine
4.- Recent Clearcut (within 5 yrs.) bottom land hardwood
5.- Recent clearcut (within 5 yrs.) mixed pine-hardwood
6.- Recent clearcut (within 5 yrs.) pure pine
7.- Agricultural
8.- Pasture

Station Condition

0 - Unreadable
1 - Readable

Animal Visit

0 - No visit
1 - Visit (indicated by tracks)

Scent Station Number	Station Condition	Bobcat Visit	Raccoon Visit	Fox Visit	Dog Visit	Coyote Visit	Skunk Visit	Opossum Visit	Habitat Type	Remarks
1	1						1	1	1	
2	1									
3	1						1	1	1	rabbit, armadillo
4	1								7	0
5	1							1	1	
6	1							1	1	
7	1							1	7	
8	1							1	7	
9	1							1	7	
10	1								7	house cD
11	1								7	unknown
12	1								7	rabbit
13	1							1	7	
14	1							1	7	
15	1					1		1	1	
16	1							1	1	
17	1		1						1	
18	1								1	0
19	1							1	7	
20	1							1	8	
21	1		1						8	
22	1		1						8	

APPENDIX G

FUR ANIMAL CENSUS

Field Data Sheet

Page 2

Scent Station Number	Station Condition	Bobcat Visit	Raccoon Visit	Fox Visit	Dog Visit	Coyote Visit	Skunk Visit	Opossum Visit	Habitat Type	Remarks
24	/	/							/	
25	/		/					/	1	
26	/							/	1	
27	/						/	/	1	
28	/							/	8	
29	/		/						1	
30	/							/	8	
31	/								1	0
32	/							/	7	
33	/							/	7	
34	/						/	/	8	
35	/	/							7	
36	/							/	8	
37	/							/	8	
38	/		/						1	
39	/		/				/	/	1	
40	/							/	1	
41	/								1	0
42	/								8	0
43	/								7	0
44	/						/		7	
45	/								7	0
46	/							/	7	
47	/								7	armadillo
48	/							/	8	
49	/				/				8	
50	/							/	8	

APPENDIX H

ALLIGATOR SURVEY FORM

GENERAL INFORMATION

Date: _____ STATE: _____

County or Parish _____ Nearest Town: _____

Route Description: _____

_____

Starting Time: _____ Completion Time: _____

Total Distance Surveyed: _____

Type Boat and Motor: _____

Observer: _____

Boat Operator: _____

Light Used: _____

Air Temperature: _____ Measured: ☐ Estimated: ☐

Rainfall (Past 24 hours): _____ Measured: ☐ Estimated: ☐

Cloud Cover (Percent): _____

Wind Velocity and Direction: _____

Moon Phase: _____

Water Level (Low, Normal, Flooding): _____

Water Temperature: _____ Measured: ☐ Estimated: ☐

Was any portion of the survey line on a wildlife refuge, park, management area, or other area providing special protection? Yes _____ No _____

If yes, please indicate the percent on the refuge. _____%

REMARKS: _____

_____

_____

_____

_____

APPENDIX I

ALLIGATOR SURVEY FORM
TALLY SHEET

Observation According to Size Classes
(Length in Feet)

Number of Alligators Seen

Total Length (Feet)	Date _____ Line No. _____	Date _____ Line No. _____	Date _____ Line No. _____	Date _____ Line No. _____
Less than 1				
1 - 2				
2 - 3				
3 - 4				
4 - 5				
5 - 6				
Unknown 6				
6 - 7				
7 - 8				
8 - 9				
9 - 10				
10' or over				
Unknown 6' or over				
*Unknown				
Total				

** Percent of line on a refuge _____

Total distance surveyed (miles) _____

State: _____ County (Parish): _____

Observer(s): _____

Provide a description of each line: _____

*Observed but could not approach to identify size class.

**Indicate the percentage of the survey line that lies within a wildlife refuge, park, management area, or other area providing specialist protection.

APPENDIX J

Table 1. Whistles per stop recorded during the 1987 statewide fall whistling counts for bobwhites.

Date	Route Number	Whistles Per Stop 1987	Whistles Per Stop 1986
Pt. Polk			
4 November 1987	None	0.25	0.53[A]
Camp Beauregard			
2 November 1987	None	0.05	0.05[A]
Loblolly (Florida Parishes)			
1 November 1987	18	0.15	0.05
28 October 1987	21	0.35	0.21[A]
3 November 1987	29	0.40	0.30
26 October 1987	35	0.40	0.20
2 November 1987	43	0.24[B]	0.44[C]
29 October 1987	46	0.70	0.40
	Mean	0.38	0.26
Longleaf			
31 October 1987	30	0.15	0.00
3 November 1987	50	0.16[A]	0.1[A]
30 October 1987	10	0.16[A]	0.25[D]
4 November 1987	11	0.25	0.24[B]
27 October 1987	17	0.37[A]	0.25
29 October 1987	23	0.71[D]	0.61[C]
28 October 1987	34	0.42[A]	0.07[E]
2 November 1987	37	0.22[C]	0.25[D]
6 November 1987	39	0.10	0.37[A]
28 October 1987	40	0.25	0.25
5 November 1987	44	0.11	0.10
3 November 1987	50	0.35	0.16[A]
3 November 1987	52	0.90	0.68[A]
2 November 1987	56	0.20	0.16[A]
	Mean	0.31	0.25

APPENDIX K

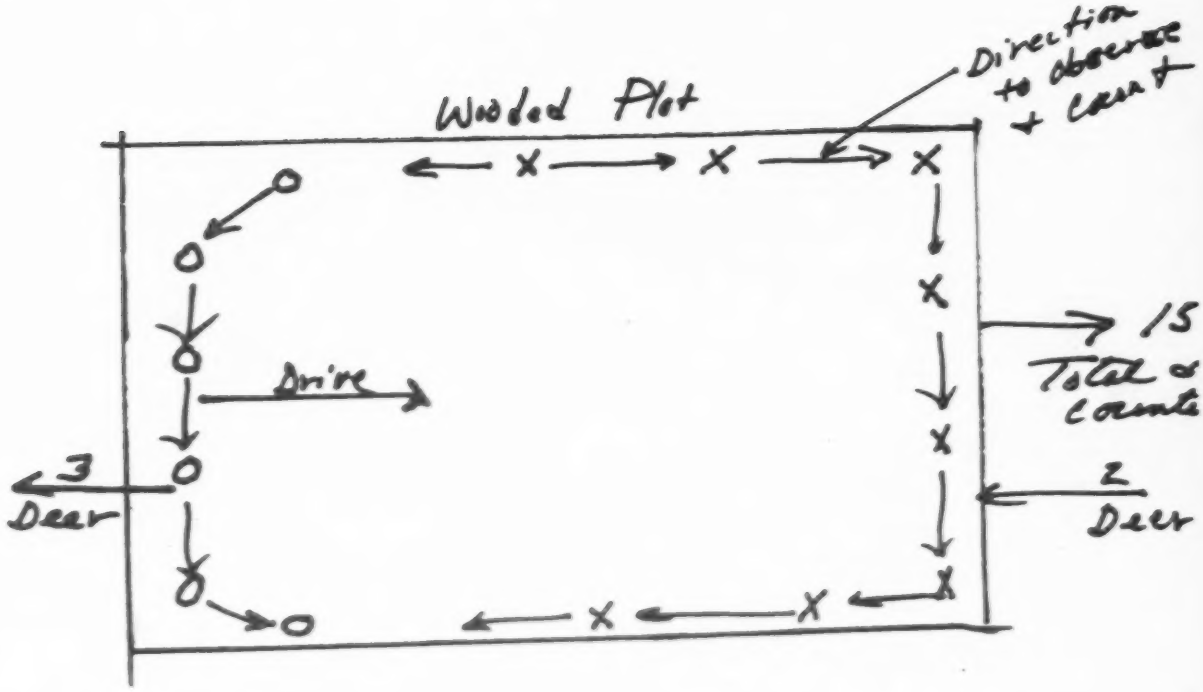
Date	Route Number	Whistles Per Stop 1987	1986
Rice			
26 October 1987	2	0.06[C]	0.22[C]
29 October 1987	13	0.13[E]	0.06[D]
28 October 1987	32	0.15	0.05
31 October 1987	41	0.06[C]	0.37[A]
	49	0.00[F]	0.00[F]
30 October 1987	67	0.39[C]	0.26[A]
	Mean	0.13	0.16
Shortleaf/Loblolly/Hardwood			
30 October 1987	90	0.22[C]	0.30
27 October 1987	15	0.20	0.10
30 October 1987	22	0.05	0.10
3 November 1987	25	0.00	0.11[A]
29 October 1987	26	0.05	0.22
3 November 1987	28	0.10	0.00
2 November 1987	30	0.25	0.30
3 November 1987	31	0.50[C]	0.25
29 October 1987	36	0.05	0.10
27 October 1987	47	0.15	0.40
2 November 1987	48	0.30	0.20
2 November 1987	53	0.00	0.10
28 October 1987	55	0.20	0.10
31 October 1987	59	0.10	0.25
6 November 1987	62	0.10	0.20
4 November 1987	69	0.30	0.15
	Mean	0.16	0.18
Soybeans			
2 November 1987	6	0.30	0.15
1 November 1987	12	0.11[A]	0.05
29 October 1987	14	0.00[B]	0.06[C]
4 November 1987	16	0.00[F]	0.00[F]
29 October 1987	20	0.15	0.25
28 October 1987	33	0.25	0.10
	Mean	0.14	0.10
Mean for all routes		0.22	0.20

APPENDIX L

[A]Only 19 stops were whistled on this route instead of the normal 20.
[B]Only 17 stops were whistled on this route instead of the normal 20.
[C]Only 18 stops were whistled on this route instead of the normal 20.
[D]Only 16 stops were whistled on this route instead of the normal 20.
[E]Only 15 stops were whistled on this route instead of the normal 20.
[F]Assumed.

ILLUSTRATION A

SAMPLE PLOT - DEER DRIVE COUNT



0 = Drivers
X = Counters

Observed - 15 deer passed through the line
- 3 deer passed back through the drive crew
- 2 deer entered ahead of crew

Total deer observed - 18
Less deer entered -2
Net Yield 16

Note: This survey is not practiced by Wildlife and Fisheries in Louisiana; however, it has been used successfully in other states.

UNIT V
IDENTIFYING AND CONTROLLING WILDLIFE DAMAGE

INTRODUCTION

For many years wild animals have played the role of a Dr. Jekyll and Mr. Hyde. Although they have long been valuable for both food and pleasure, at times they present a problem to mankind. Too often birds have infested rice fields, rodents have caused serious farmstead problems, and wild animals have transmitted diseases to man, his pets, and his livestock.

The purpose of this unit is to provide technical information and basic practical procedures in the identification and control of wildlife damage.

COMPETENCIES

To gain skill in the identification of wildlife damage and methods implemented for its control.

GENERAL PERFORMANCE OBJECTIVES/GOALS

Upon completion of this unit, students should be able to:

1. Identify terms related to identifying and controlling wildlife damage.
2. Determine presence of predation.
3. Identify the species of predator involved.
4. Identify crop, forest, and range damage.
5. Identify symptoms of a rabid animal.
6. Identify various mechanical and chemical control techniques.

SPECIFIC PERFORMANCE OBJECTIVES AND MASTERY CRITERIA

1. Given a list of terms related to identification and control of wildlife damage, students will be able to identify or give the meaning of each term with at least 75% accuracy.

2. Given a written exam on methods of predation identification, students will be able to identify or give meaning of methods with at least 75% accuracy.

3. Given a written exam on identification of predator species, students will be able to identify the species of predator involved with at least 75% accuracy.

4. Given a written exam on identification of crop, forest, and range damage, students will be able to identify various signs of this type of damage with at least 75% accuracy.

5. Given a written exam on identification of rabid animals, students will be able to identify various symptoms with at least 75% accuracy.

6. Given a written exam on control of wildlife damage, students will be able to identify and give the application of various types of mechanical control techniques with at least 75% accuracy.

METHODOLOGY

A variety of methods can be used to teach this unit. The instructor may arrange for a resource person (wildlife biologist), plan field trips to wildlife management areas or other appropriate activities in addition to classroom lecture.

SUGGESTED INTEREST APPROACHES

1. Plan for a specialist (possibly from Louisiana Wildlife and Fisheries) to make presentation on previous experiences dealing with identification and control of wildlife damage.

2. Plan a field trip to a local wildlife management area.

3. Discuss with students the need for being knowledgeable in the area of identification and control of wildlife damage.

UNIT OUTLINE

I. Terms

A. Predation

B. Predator

C. Rabid

D. Canid

E. Thoracic

F. Ungulates

G. Crop

H. Anal

I. Vegetation

J. Fauna

K. Acetylene

L. Roost

II. Methods of Predation Identification

III. Identification of Predator Species

IV. Identification of Crop, Forest, and Range Damage

V. Symptoms of Rabid Animals

VI. Mechanical and Chemical Control Techniques of Wildlife Damage

SPECIFIC PERFORMANCE OBJECTIVES AND LEARNING ACTIVITIES

OBJECTIVE 1. Given a list of terms related to identification and control of wildlife damage, students will be able to identify or give the meaning of each term with at least 75% accuracy.

SUBJECT MATTER CONTENT

A. Terms

1. Predation - act of preying upon.
2. Predator - one that preys.
3. Rabid - conditions associated with animals affected with rabies.
4. Canid - referring to flesh eating mammals.
5. Thoracic - referring to part of an animal's body between the neck and abdomen.
6. Ungulates - hoofed mammals.
7. Crop - a pouchlike place in the throat of many birds, where food is prepared for digestion.
8. Anal - refers to the posterior opening of the alimentary canal.
9. Vegetation - plant life.
10. Fauna - animals of a particular region or period.
11. Acetylene - a colorless gas combined with oxygen for welding.
12. Roost - a resting place as for birds at night.

LEARNING ACTIVITIES

1. Prepare a list of terms associated with the identification and control of wildlife damage.
2. Discuss the meaning of the terms in relation to various phases of identifying and controlling wildlife damage.
3. Obtain necessary materials to either show terms which are material in nature or demonstrate those which are abstract.

OBJECTIVE 2. Given a written exam on methods of predation identification, students will be able to identify or give meaning of methods with at least 75% accuracy.

SUBJECT MATTER CONTENT

A. Identification of Damage

1. If damage to resources are of great enough magnitude, then control of species may be considered.

2. Prior to initiating control or selection of a control tool, one must determine which species is responsible for the mortality or damage.

3. One should not assume that predation has occurred.

4. A number of things can possibly simulate predation.

   a. Toxic plants and water

   b. Senility

   c. Wounds

   d. Starvation

   e. Disease

   f. Nest predation being simulated by farm machinery and livestock trampling damage.

B. Carcass Examination

1. Determination of whether predation caused death may be determined by a careful external examination of the victim for tooth and claw marks and tears.

2. Determination of death by this means gets more difficult as the carcass gets older.

3. If external evidence is not conclusive, the muscle tissue should be examined following skinning for tooth or claw-puncture marks and for bruises and blood clots that may have been made by a predator.

4. When determination of predation has occurred but uncertainty as to whether it caused death arises, finding bruises or clots may clear up the issue because bruises and clots are not formed after death.

C. Area Examination

1. The general area around the carcass should be examined for signs of a struggle.

2. Tracks and droppings in the area of the carcass may help determine which animals have visited the carcass.

3. Droppings may also help determine foods eaten by the visiting animals.

4. Wool, hair, or feathers removed by the predator during a struggle may be found in the area.

5. Predation may also be determined by the presence of blood stains in the area of the carcass.

LEARNING ACTIVITIES

1. Prepare a list of both carcass examination and area examination clues which the student can use for quick reference.

2. Obtain charts which illustrate the paw marks of various known predators.

3. Have students physically examine and observe the carcass of an animal in which predation occurred following of death.

OBJECTIVE 3. Given a written exam on identification of predator species, students will be able to identify the species of predator involved with at least 75% accuracy.

SUBJECT MATTER CONTENT

1. Most species of predators have recognizable behavioral patterns of attacking and feeding on their prey.

a. Coyotes

1. A canid which preys on rodents, rabbits, deer, antelope, sheep, calves, poultry, swine, and birds.

2. The coyote normally kills by attacking the thoracic region of its prey.

3. The hind legs and flanks may also be attacked on large deer and calves.

4. Losses to penned sheep and turkeys occasionally occurs by the predator simply harassing the prey from outside the pen until they stampede and pile-up in a corner causing death by suffocation.

b. Wolves

1. Wolves may include such large ungulates as caribou, moose, and elk as their prey.

2. Common victims of this canid are rodents, rabbits, deer, antelope, sheep, calves, poultry, swine, and birds.

3. Usually attacks livestock and big game animals by the flank.

4. Slash marks may be found on the rear legs and flanks.

5. Downed prey are usually disemboweled and unborn young may be eaten first.

c. Fox

1. Mice and rabbit form the staple of the diet for the fox.

2. Its largest prey includes young lambs and pigs, adult jack rabbits, and turkeys.

3. Prey is usually carried some distance from the kill location, often to its den.

4. Carcass remains are often hidden in debris or partially buried in a hole they have scratched in the soil.

d. Raccoon

1. Little evidence confirms that raccoons prey heavily on mammals.

2. Common prey consists of birds and their eggs.

3. They do on occasion kill poultry, small lambs and kid goats, usually feeding on only the eyes and tongue of lambs and goats.

4. Heads of adult birds are usually bitten off and found some distance from the remainder of the carcass.

5. The breast and crop of its prey are sometimes torn and chewed, and the entrails are sometimes eaten.

e. Skunk

1. Accused of killing poultry and small game species.

2. Actually kill few adult birds compared to the nests they rob.

3. Rabbits, chickens, and pheasants are usually eaten as carrion, even though they are dragged to predator's den.

4. Skunks are noted as being egg robbers.

5. Eggs are usually opened at one end and the edges are crushed while the skunk forces its nose into the hole to lick out its contents.

f. Opossum

1. Most noted for their predation on birds and their eggs.

2. Opossums maul chickens they kill.

3. Usually initiate their attack on poultry by feeding at the anal opening.

4. Young poultry and game birds are consumed whole.

g. Rats

1. Norway rats kill adult chickens by biting their throats, often killing more than needed for food.

2. Their victims are often found piled in a corner or in burrows.

3. Rats have on occasion been known to kill newborn lambs by attacking their navel.

LEARNING ACTIVITIES

1. Prepare a chart containing common predators, their prey, methods of attack, and other such characteristics to help identify various species of predators.

2. Have students examine carcasses of various species to compare killing methods of various predators.

OBJECTIVE 4. Given a written exam on identification of crop, forest, and range damage, students will be able to identify various signs of this type damage with at least 75% accuracy.

SUBJECT MATTER CONTENT

1. Determining whether crops, forage, or trees are being damaged by wildlife is not as difficult as determining predation.

2. Observers can often see wild animals doing damage such as antelope eating unharvested wheat, blackbirds feeding on rice, etc.

3. Observation of tracks, droppings, tooth marks, dens, feathers, burrows, and trails cut through vegetation by small rodents can help determine if damage was caused by wildlife and if so the species.

4. After an area's fauna is determined, the cause of damage is easier to establish due to the fact that different species have individual behavioral characteristics.

LEARNING ACTIVITIES

1. Students will be given a list of pests common to various crops, various types of forest, and to ranges.

2. Students will take a field trip to observe various signs of wildlife damage to crops, forest, etc.

OBJECTIVE 5. Given a written exam on identification of rabid animals, students will be able to identify various symptoms with at least 75% accuracy.

SUBJECT MATTER CONTENT

1. Rabies is an acute contagious viral disease.

2. Characterized by observable symptoms.

   a. Mental disturbance

   b. Excitability

   c. Paralysis

   d. Death

3. The virus found in the saliva of contagious animals is usually passed on by a bite.

4. The virus may also be spread by contact with cuts or scratches when rabid animals are carelessly handled.

5. The brain of an animal suspected of dying of rabies must be submitted to a diagnostic laboratory to confirm the disease.

LEARNING ACTIVITIES

1. A veterinarian can be used as a resource person to explain to students the symptoms and effects of the disease.

2. If available, films showing rabid animals can be shown to students.

OBJECTIVE 6. Given a written exam on control of wildlife damage, students will be able to identify and give the application of various types of mechanical control techniques with at least 75% accuracy.

SUBJECT MATTER CONTENT

1. Prior to starting an animal damage control program, one should inquire about local, state, and federal regulations which may apply to the target species or the control tools to be considered.

2. Mechanical Control/Birds

   a. Cages or live traps

      1. Several variations exist.

      2. Basically all consist of a rectangularly shaped frame covered with wire mesh (chicken wire).

      3. They may be baited with food and water and live decoy birds may be used as an attraction for luring other birds into the trap.

   b. Gas exploders

      1. Have been used to alleviate bird damage in grain fields and orchards for years.

      2. Loud explosions are produced at automatically timed intervals.

3. Two basic types are used. In one type the explosion is caused when acetylene gas is produced from water dripping onto carbide powder. The other type utilizes butane or propane to cause the explosion.

4. Location of the exploders should be changed frequently to increase effectiveness.

c. Shooting

1. Has limited effectiveness whether to frighten or kill depredating birds.

2. More agricultural applications exist since the discharge of firearms is usually prohibited by law in urban areas.

3. Discharging a shotgun with either regular ammunition or shell crackers has been an effective bird-scaring tool. Shell crackers are special shells that discharge a projectile which explodes after traveling about 200 yards.

d. Floodlight traps

1. Effective in capturing large numbers of birds at night around roost site locations.

2. Hugh metal frames which support a funnel shaped net comprises the trap.

3. Mechanical Control - Predators and Rodents

a. Steel leg-hold traps

1. Designed to capture animals ranging in size from rats to bears.

2. If not baited, it is usually placed in the travel lane of the animal and is called a "blind set".

3. A "baited set" uses the animal's food or some other lure to attract predator.

4. Location of the trap is the key to success. The trap should be placed only in areas where the offending animal frequently travels.

5. The trap should be attached to a firm anchor (usually a stake) or connected to a "drag".

6. They have the disadvantage of not being selective, and could accidentally catch domestic species of dogs and cats.

b. Box traps

1. They are usually rectangular-shaped and made from wood or heavy-gauge mesh wire.

2. Designed to capture animals alive and uninjured.

3. They are usually placed in an animal's travel lane or near the entrance of its den.

4. More success is noted when the traps are baited.

c. Snap traps

1. These are regular rat or mouse traps usually placed in buildings.

d. Snares

1. Usually made of wire or cable.

2. Body snares are placed where they are likely to catch the animal's head.

3. A foot snare is tripped when an animal places its foot on a triggering device.

e. Conibear traps

1. Chiefly used for muskrat and beaver control in shallow water.

2. They have a humane feature of killing quickly.

3. Its main disadvantage is that non-target animals will also be killed if captured.

LEARNING ACTIVITIES

1. Prepare a list of common mechanical control devices including information about species they are effective on, techniques of their use, advantages as well as disadvantages of their use.

2. Various mechanical control devices can be brought to the classroom for student examination.

UNIT V TEST

1. Define the following terms:

   a. Predation:

   b. Predator:

   c. Rabid:

   d. Canid:

   e. Thoracic:

   f. Ungulates:

   g. Crop:

   h. Anal:

   i. Vegetation:

   j. Fauna:

   k. Acetylene:

   l. Roost:

2. What are the two types of examinations used in identifying wildlife damage?

   a.

   b.

3. What alternative does one have if external examination of the carcass does not conclusively determine predation?

4. What should one look for in the area of the attack to help determine predator species?

5. List common predators mentioned in the unit.

   a.

   b.

   c.

   d.

   e.

   f.

   g.

6. Why is it relatively easy to determine whether crops, forage, or trees are being damaged by wildlife?

7. Define rabies.

8. List characteristics observed in rabid animals.

   a.

   b.

   c.

   d.

9. What should one do prior to starting an animal control program?

10. List 4 types of mechanical control used for birds.

    a.

    b.

    c.

    d.

11. List 5 types of mechanical control used for predators and rodents.

    a.

    b.

    c.

    d.

    e.

12. What disadvantage do steel leg-hold traps and conibear traps have in common?

UNIT V TEST
ANSWER KEY

1. a. act of preying upon

   b. one that preys

   c. conditions associated with animals affected with rabies

   d. referring to flesh eating animals

   e. referring to part of an animals body between the neck and abdomen

   f. hoofed mammals

   g. a pouchlike place in the throat of many birds, where food is prepared for digestion

   h. refers to the posterior opening of the alimentary canal

   i. plant life

   j. animals of a particular region or period

   k. a colorless gas combined with oxygen for welding

   l. a resting place as for birds at night

2. Carcass examination and area examination.

3. The carcass should be skinned and the muscle tissue should be examined for tooth or claw-puncture marks and for bruises and blood clots that may have been made by a predator.

4. One should look for signs of a struggle, tracks, droppings, wool, hair, feathers, or the presence of blood stains.

5. a. Coyotes

   b. Wolves

   c. Fox

   d. Raccoon

   e. Skunk

f. Opossum

g. Rats

6. Observers can often see wild animals doing damage. Evidence such as tracks, droppings, tooth marks, etc. are readily seen.

7. An acute contagious viral disease.

8. a. Mental disturbance

b. Excitability

c. Paralysis

d. Death

9. Inquire about local, state, and federal regulations which may apply to the target species or the control tools to be considered.

10. a. Cages or live traps

b. Gas exploders

c. Shooting

d. Floodlight traps

11. a. Steel leg-hold traps

b. Box traps

c. Snap traps

d. Snares

e. Conibear traps

12. They are not selective to the targeted species.

UNIT V
EVALUATION AND TESTING

Ways to Evaluate Pupil Growth

Participate in field trials
Participation in classroom discussion
Unit test

EQUIPMENT AND SUPPLIES

Student

Reference material
Notebook

Teacher

Reference material
Various mechanical traps for examination
Slides showing various wildlife damage

UNIT V
SUPPLEMENTARY MATERIALS

Louisiana Conservationist, Louisiana Wildlife and Fisheries (various issues).

Presentation from Louisiana Wildlife and Fisheries Agent.

Wildlife Management Techniques. Robert H. Giles, 1984. The Wildlife Society, Washington D.C.

UNIT VI
ALLIGATOR PRODUCTION AND HARVESTING

INTRODUCTION

Alligator production and harvesting has turned into big business in the State of Louisiana. In 1988, the alligator will add approximately $10 million dollars to the Louisiana economy. The alligator has risen from the doors of extinction in 1962, when harvesting was ended, to regain its place in Louisiana to the point that over 25 thousand alligators will be harvested this year.

The purpose of this unit is to provide students with an introduction to alligator production and hunting, and the uses of alligators in Louisiana and the world.

COMPETENCIES

To develop skills in alligator production and hunting to use as a primary or secondary source of income.

GENERAL PERFORMANCE OBJECTIVE/GOALS

Upon completion of this unit, students should be able to:

1. Describe the conditions needed to produce alligators in confinement.
2. Describe how alligators are harvested in the wild.
3. List the uses of alligators.

SPECIFIC PERFORMANCE OBJECTIVES AND MASTERY CRITERIA

1. Given the conditions needed to produce alligators in confinement, students will be able to list the factors involved with at least 75% accuracy.
2. Given the requirements for harvesting alligators in the wild, students will be able to identify these requirements with at least 75% accuracy.
3. Given the major uses of alligators, students will be able to list them with at least 75% accuracy.

METHODOLOGY

A combination of methods can be used to teach this unit. Lecture and class discussion should be used to introduce the material and bring out specifics on alligator production. The instructor may then incorporate field trips to an alligator farm, a wildlife refuge doing work with alligators, use resource persons and use demonstrations, if possible.

SUGGESTED INTEREST APPROACHES

1. Discuss with the class potential income from raising and harvesting alligators.
2. Plan field trips to a farm producing alligators or a wildlife refuge doing work with alligators.
3. Have resource persons discuss the opportunities involved in alligator production and hunting.
4. Give demonstrations on the uses of alligators.

UNIT OUTLINE

I. Alligator Production
   - A. Availability of stock
   - B. Housing
   - C. Feeding
   - D. Harvesting
   - E. Restocking

II. Harvesting of Wild Alligators
   - A. Alligator inventories through population surveys
   - B. Harvest season
   - C. Harvest methods
   - D. Licenses
   - E. Tagging
   - F. Sales and records

III. Uses of Alligators

A. History

B. Oil, shoes and luggage

C. Meat

SPECIFIC PERFORMANCE OBJECTIVES AND LEARNING ACTIVITIES

OBJECTIVE 1. Given the conditions needed to produce alligators in confinement, students will be able to list the factors involved with at least 75% accuracy.

SUBJECT MATTER CONTENT

The farming of alligators has become big business in Louisiana. Many people are now raising alligators on farms like you would any other kind of livestock. There are some important factors which must be considered, however, before you begin raising alligators. Among the restrictions which must be considered are availability of stock, housing, feeding, harvesting and restocking.

Since the farming of alligators is still a relatively new program, the availability of stock alligators for alligator farms is still somewhat limited. The farming of alligators is still to a large extent under the supervision of the Louisiana Wildlife and Fisheries Department. Anyone wishing to receive stock alligators must put their names on a waiting list with the Wildlife and Fisheries Department as only a limited number of hatchlings are available. The number available each year is determined by the number of eggs collected and hatched each year. Nest of eggs can range in size from 2 to 58 eggs with 39 eggs being the average available in each nest collected. Alligators usually begin nesting and laying eggs in June. It is at this time that nests are targeted, and collection people go through the marshes collecting eggs being very careful to make sure and mark the tops of the eggs to have them laying in the incubator the same way they were in the nest. These eggs are then taken and put into incubators for hatching. The Louisiana Department of Wildlife and Fisheries through the use of extensive research and studies has discovered that the sex of alligators can be determined by controlling the temperature in the incubator. Temperatures equal to or less than 30 degrees C produces all females, and temperatures

equal to or greater than 34 degrees C produces all males. This is important because males usually grow faster than females, so during incubation the temperature is usually set around 89 degrees F, this produces 60% males and 40% females. Females must be produced for restocking which will be discussed later. Hatchlings are then distributed to alligator farmers in order of the allocations on the list previously discussed.

These hatchlings are then put into specially designed houses to provide optimum conditions for the most growth possible. The houses are constructed of concrete walls and floors, and divided into sections with climb proof sides. The houses must be designed to hold water and be easily cleaned, since they must be cleaned often. The water is heated and circulated continuously to keep the alligators active and growing year round. The growth rate of alligators in these houses is much higher than for alligators in the wild, because of the optimum growing conditions and because alligators in the wild hibernate during the winter months. (See Appendix A (page VI-15), for an example of a small alligator house.)

The diets of alligators of this size in the wild would consist mostly of crabs, crawfish, small fish, and reptiles until they get bigger to catch and eat muskrats, nutria, or anything coming in range of their jaws. Since these alligators are fed by hand they can be fed fish or nutria which are abundant in Louisiana. After trapping season, however, nutria must be frozen and stored for the rest of the year. Studies do not indicate much difference in growth rate when using fish or nutria, but they have indicated differences in reproduction capability with nutria being much better than fish. Another problem with a fish diet is that if alligators over eat it, gout is the result, which causes lowered growth because they must be taken off their normal diet for about two weeks. Most alligator farmers in Louisiana feed nutria if possible.

Harvesting of these alligators is relatively easy since they are in confinement. But licensed alligator farmers or breeders must have the Louisiana Department of Wildlife and Fisheries authorization to kill and skin these alligators, and they must follow the same rules and regulations which apply to wild alligators. These farmers must also have department authorization to sell or transfer live alligators or eggs.

Restocking is an important consideration and all alligator farmers must return alligators back into the wild to help maintain the alligator population. Studies and surveys have found that less than 10% of all alligators

hatched reach the 3 to 4 foot size, which is important because this is the size that man is usually the only predator and the survival of the animal is fairly well assured. Alligator farmers must keep alligators as breeding stock and they must return 17% of the hatchlings which they receive back into the wild when they reach the 3 to 4 foot size.

As you can see alligator farming is of great benefit to the alligator as well as man. By collecting eggs and farming alligators, the alligator population in Louisiana and the United States will be protected and increase.

LEARNING ACTIVITIES

1. Discuss with the class how alligators are farmed.

2. Take a trip to Rockefeller Refuge to learn about egg collection, incubation and stocking.

3. Visit a local alligator farm to see how alligator houses are made and learn about nutrition.

4. Have a local farmer bring in baby alligators, and talk about alligator production.

OBJECTIVE 2. Given the requirements for harvesting alligators in the wild, students will be able to identify these requirements with at least 75% accuracy.

SUBJECT MATTER CONTENT

Studies and research of alligators in the wild have been conducted extensively for many years. Louisiana Wildlife and Fisheries personnel Larry McNease and Ted Joanen are among the best recognized alligator researchers in the world today and have worked hard to improve alligator management in Louisiana. The survival of alligators in the wild have been closely correlated with the following factors: nesting effort, nest flooding, desiccation mortality, predation of alligator eggs and young and cannibalism. Studies and surveys are being done continuously to make sure that alligator populations are maintained. To determine how many alligators will be harvested for a given area Wildlife and Fisheries personnel conduct Aerial Nest Censuses, flying over areas and counting nests. From research and studies of past years, an average number of alligators will be calculated and

used as a base number. They also know that to maintain a base population of 100,000 alligators for 20 years they can be subjected to a hunting rate of just greater than 5%. They then calculate how many alligators can be harvested from each area and issue that number of tags to the hunters in that area. These tags are not transferable and cannot be used on any other area. The following are additional rules and regulations which must be followed when harvesting wild alligators.

Harvest Season - The open season runs for 31 days and starts the beginning of September and runs through the beginning of October. It is illegal to take, possess or sell alligators or their skin under 4 feet in length.

Harvest Methods - Alligators may be taken during daylight hours, between official sunrise and official sunset. Special instructions will be issued to the holders of alligator hunting licenses shortly before the opening of the season describing detailed methods regarding the skinning of alligators. Pole hunting is prohibited to protect the nesting female population. Hooks and lines may be set no more than one day prior to the season opening. No hook or line shall remain set after the closing day of the alligator season. All alligator hooks and lines must be checked daily and all hooks and lines must be removed after a hunter's tag quota is reached. Alligators cannot be cut loose from hooks and lines for the purpose of selecting larger alligators.

Licenses - An alligator hunter must have in possession a valid commercial alligator hunter license to take or sell alligators, their skins or other parts (See Appendix B, page VI-16 for Licenses Application).

Tagging - In addition to a valid commercial alligator hunting license, the hunter must also obtain from the Louisiana Department of Wildlife and Fisheries, and have in his possession while hunting, official tags which must be firmly attached to each alligator immediately upon taking. The tag must remain attached to the skin until processed by the fabricator. The number of tags issued will be on the basis of the quantity and quality of the habitat, and the rate per acre will be fixed based on extensive population estimates. Tags can be used only on the lands applied for and approved on the application (See Appendix C, page VI-17 for Alligator Tag).

Sales and Records - The sale of alligator skins and parts are strictly regulated by the Louisiana Department of Wildlife and Fisheries. Alligator hunters, buyers and dealers must fill out the appropriate forms and follow all the rules and regulations set up by the Department of

Wildlife and Fisheries. (See Appendix D, E, F, G, H, I, and J, for samples of the forms which must be completed.)

LEARNING ACTIVITIES

1. Discuss with the class the ways which are used to harvest alligators.

2. Demonstrate the type of line, hooks and bait used for alligator hunting.

3. Have a local alligator hunter come in to discuss and demonstrate how alligator hunting is accomplished.

4. Review all the forms used for hunting alligators.

5. Review and demonstrate the hazards and safety precautions for hunting alligators.

OBJECTIVE 3. Given the major uses of alligators, students will be able to list them with at least 75% accuracy.

SUBJECT MATTER CONTENT

The alligator has been used in commercial trade since 1800. They were killed in the early 1800's for use as water proof foot wear and clothing but did not do a good job, so this was discontinued. Audubon in 1827 wrote alligators were shot and their oil used for greasing the machinery of steam engines and cotton mills. Around 1855 they became very fashionable for shoe leather, with this trend continuing in varying degrees to the present.

Today alligators are still in large demand for their hides to be used in shoes and boots, luggage, attache cases, wallets and purses.

The newest market for alligators in today's world is the use of alligator meat. With the uniqueness of Cajun Food taking over, alligator meat has increased in demand. Alligator meat comes in four types, from different parts of the alligator, (1) Jaw meat, (2) Torso meat, (3) Leg meat and (4) Tail meat. (See Appendix K, page VI-25, for the location of each cut and the percent of meat.)

LEARNING ACTIVITIES

1. Discuss the uses of alligators with the class.

2. Show articles made from alligators to the class.

3. Bring in a local alligator hunter to prepare alligator meat for the class to taste.

UNIT VI TEST

1. List the restrictions which must be considered before beginning alligator farming.

   a.

   b.

   c.

   d.

   e.

2. The average number of eggs produced per nest is _____.

3. The sex of alligators can be controlled by controlling the temperature during incubation.
   True or False _____

4. An incubator temperature of _____ degrees F will give 60% males and 40% females at hatching.

5. _____ is the most commonly used alligator feed.

6. Alligator farmers must return _____% of the hatchlings they receive back into the wild when they reach the 3 to 4 foot size.

7. Wildlife and Fisheries personnel conduct _____, _____ _____ by flying over areas and counting nests.

8. The open season of alligator hunting last for _____ days.

9. _____ hunting is illegal for hunting alligators, to protect nesting females.

10. All alligator hunters must have a valid commercial alligator hunting _____.

11. The number of alligators which can be taken from a given area is determined by the number of _____ allocated for that area.

12. An early use for alligators was as _____ for greasing the machinery of steam engines and cotton mills.

13. List any 4 of the uses of alligator skins today.

a.

b.

c.

d.

14. The 4 types of meat which come from alligators are:

a.

b.

c.

d.

UNIV VI TEST
ANSWER KEY

1. a. availability of stock
   b. housing
   c. feeding
   d. harvesting
   e. restocking
2. 39
3. True
4. 89
5. Nutria
6. 17
7. Aerial Nest Censuses
8. 31
9. Pole
10. License
11. Tags
12. Oil
13. a. shoes and boots
    b. luggage
    c. attache cases
    d. wallets
    e. purses

14. a. jaw meat

b. torso meat

c. leg meat

d. tail meat

UNIT VI
EVALUATION AND TESTING

Ways to Evaluate Pupil Growth

Class participation and discussion
Students writing papers on alligator production, harvesting or uses
Unit test

EQUIPMENT AND SUPPLIES

Student

Reference materials
Notebook

Teacher

Reference material
Handouts
Overhead projector
Transparencies
Resource personnel

UNIT VI
SUPPLEMENTARY MATERIALS

Alligators: Harvesting and Processing, Louisiana Cooperative Extension Service; Michael Woody, Paul Coriel and Ted Joanen, 1986.

Crocodiles and Alligators, Louisiana Department of Wildlife and Fisheries, Ted Joanen and Larry McNease.

Culture of Immature American Alligators in Controlled Environmental Chambers, Louisiana Department of Wildlife and Fisheries, Larry McNease and Ted Joanen.

Nature - Temperature of Egg Incubation Determines Sex, M. Ferguson and Ted Joanen, May 1982.

Nutrition of Alligators, Louisiana Department of Wildlife and Fisheries, Larry McNease and Ted Joanen, 1981.

Simulation of a Commercial Harvested Alligator Population in Louisiana, Louisiana State University, J. Nichols, L. Viehman, R. Chabreck and B. Fenderson, February 1976.

APPENDIX A

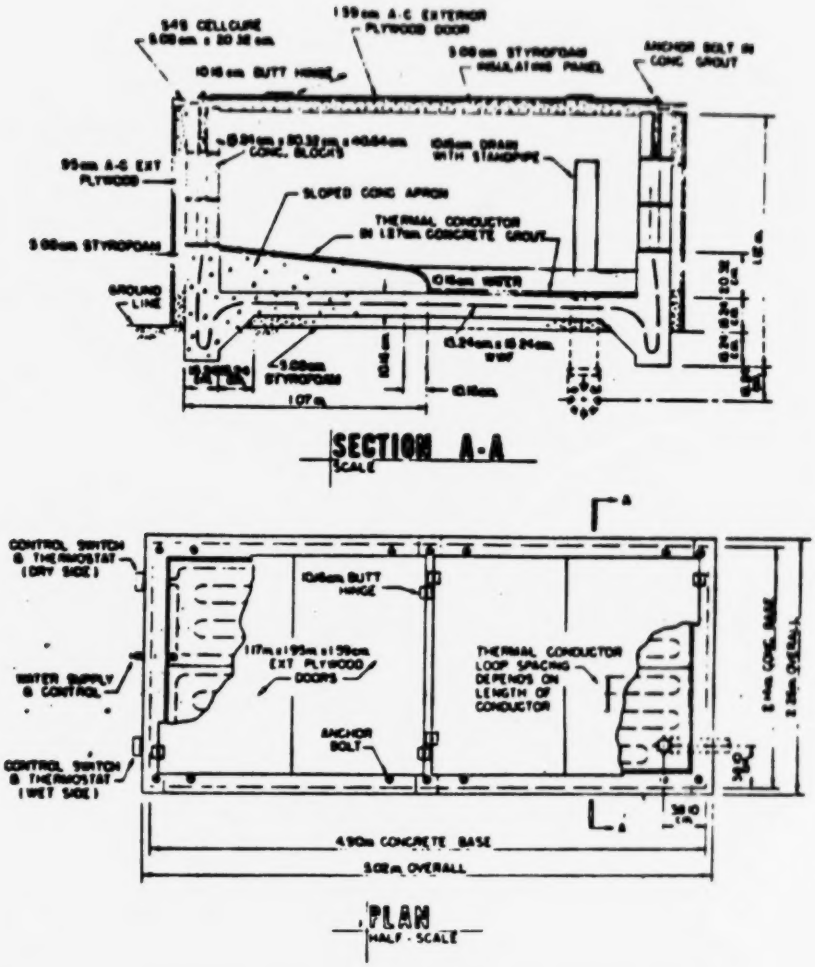


Diagram for construction of small alligator environmental chamber.

BEST COPY AVAILABLE

APPENDIX B

1986

LOUISIANA DEPARTMENT OF WILDLIFE AND FISHERIES

ALLIGATOR HUNTER LICENSE

APPLICATION FORM

SOCIAL SECURITY ___-__-____ ZONE _____

NAME _____ ADDRESS _____ PHONE _____

CITY _____ STATE __ ZIP _____

BIRTHDATE __-__-__ DRIVERS LICENSE NO _____ STATE __

RACE _____ SEX _____ HAIR _____ EYES _____

HEIGHT __FT __IN WEIGHT ___

PLEASE CHECK THE ABOVE INFORMATION FOR ACCURACY AND CORRECT IF NECESSARY

I WISH TO APPLY FOR A LICENSE TO TAKE ALLIGATORS IN THE WILD STATE

LANDOWNER OR AREA TO BE HUNTED _____ PHONE _____

ADDRESS _____ CITY _____ ZIP _____

DESCRIPTION OF AREA TO BE HUNTED:

PARISH _____ NEAREST TOWN _____ HUNTED ACRES _____

SUBMIT COPY OF PROPERTY TAX RECEIPT FOR LAND NOT HUNTED BEFORE.
COMPLETE TOWNSHIP, RANGE AND SECTION INFORMATION IS NECESSARY.

THIS ACREAGE [WAS WASNOT] (CIRCLE ONE) HUNTED LAST YEAR BY
(HUNTER) _____

_____ _____

APPLICANT DATE LANDOWNER OR MANAGER DATE

_____ _____

NOTARY PUBLIC DATE DATE ALLIGATOR HUNTING LEASE EXPIRES

DO NOT WRITE BELOW THIS LINE

ACRES	HABITAT TYPE	RATIO	PARISH	# TAGS ISSD	BEG TAG #	END TAG

_ $25 COMMERCIAL LICENSE _ $5 TAG FEE

_ $150 NON-RESIDENT LICENSE _ $25 RES SPORT / HELPER LICENSE

LICENSE NUMBER ISSUED TO THIS APPLICANT _____

IF LICENSE FOR HELPER / SPORT, (CIRCLE ONE) HUNTER / GUIDE IS: (CIRCLE ONE)

_____ _____ ___ / __ / ____

NAME LIC NO SSN

APPENDIX C

ALLIGATOR PARTS TAG

Name of Alligator Hunter

License No.

Alligator Tag No.

Date

LOUISIANA DEPARTMENT OF
WILDLIFE AND FISHERIES
P. O. BOX 15570
BATON ROUGE, LA. 70895

APPENDIX D

BY LAW, EACH ALLIGATOR HUNTER MUST FILL OUT THIS FORM AND RETURN TO T ADDRESS LISTED BELOW FOR ANY HIDE(S) NOT SOLD BY OCTOBER 21, 1986.

SOCIAL SECURITY #_____ LICENSE #_____

Hunter's Name:_____

Address: _____

_____

1986

RECORD OF HIDES NOT SOLD TO COMMERCIAL BUYERS

Tag Nos.	Hide Location or Destination (Name, Address and Phone Number)	Intended Use of Hide	Leng

This form to be used for hides not sold to commercial buyers; example: tanning, taxidermy, sport hunters, holding for better price, etc.

Form must be mailed by October 21, 1986 to:

Louisiana Department of Wildlife and Fisheries
Rockefeller Wildlife Refuge
Route 1, Box 20-B
Grand Chenier, La. 70643

APPENDIX E

ALLIGATOR PARTS SALE FORM

DEALER

Social Security No.:_____

Buyer/Dealer's Name:_____ License Number:_____

Address:_____

Date	Buyer's Name	Buyer's Address	No. Whole Carcasses	Description and No. of Parts	Alligator Hide Tag No.

I certify that the information given in this report is true and correct.

Signature:_____

(To be filed with Louisiana Department of Wildlife and Fisheries, Rockefeller Wildlife Refuge, Route 1, Box 20-B, Grand Chenier, Louisiana 70643, within 30 days following close of season and thereafter at 60-day intervals until all parts are sold).

Social Security No. _____

APPENDIX F

ALLIGATOR PARTS PURCHASE FORM

DEALER

Dealer's Name: _____ License Number: _____

Address: _____

Date	Purchased from: Name of hunter or dealer	No. Whole Carcasses	Description and No. Parts	Alligat Hide Ta Number

I certify that the information given in t report is true and correct.

Signature: _____

(To be filed with Louisiana Department of Wildlife and Fisheries, Rockefeller Wildlife Refuge, Route 1, Box 20-B, Grand Chenier, Louisiana 70643, within 30 days following t of season and thereafter at 60-day intervals until all parts are sold).

APPENDIX G

ALLIGATOR PARTS TRANSACTION FORM

HUNTER/FARMER

Social Security No.:_____

Hunter/Farmer's Name:_____ **License Number:**_____

Address:_____

Date	Buyer's Name	Buyer's Address	No. Whole Carcasses	Description and No. of Parts	Alligator Hide Tag No.

I certify that the information given in this report is true and correct.

Signature:_____

(To be filed with Louisiana Department of Wildlife and Fisheries, Rockefeller Wildlife Refuge, Route 1, Box 20-B, Grand Chenier, Louisiana 70643, within 30 days following close of season and thereafter at 60-day intervals until all parts are sold).

APPENDIX H

Social Security No. _____

ALLIGATOR BUYER-DEALER RECORD

_____ - YEAR

Hunter's Name: _____ License No: _____

Address: _____

_____

Date hides purchased: _____

Tag #	Length	Tag #	Length	Tag #	Length	Tag #	Length

Buyer or Dealer Making Purchase

Sold to: _____ License # _____

Date: _____ _____

Signature

APPENDIX I

LOUISIANA DEPARTMENT OF WILDLIFE AND FISHERIES

ROCKEFELLER WILDLIFE REFUGE
ROUTE 1, BOX 20-B
GRAND CHENIER, LOUISIANA 70643

RECEIPT FOR RETURNED ALLIGATOR TAGS

Name: _____

Social Security No.: _____

Address: _____
(Street)

_____
(City) (State) (Zip)

Telephone No.: _____

Alligator Hunter License No.: _____

Official Alligator Tags Returned

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

TOTAL NUMBER OF RETURNED TAGS

_____

_____
Hunter's Signature

_____
Date

Received by: _____
Louisiana Department of Wildlife and Fisheries

APPENDIX J

LOUISIANA DEPARTMENT OF WILDLIFE AND FISHERIES

ROCKEFELLER WILDLIFE REFUGE
ROUTE 1, BOX 20-B
GRAND CHENIER, LOUISIANA 70643

AFFIDAVIT FOR LOST OR DESTROYED ALLIGATOR TAGS

I, _____, 1986 Alligator Hunter License No. _____ declare that the following listed Alligator Hide Tags, totaling _____ tag(s) are not being returned for the reason as stated below.

Missing Tag Nos.	Reason Why Tag Not Returned

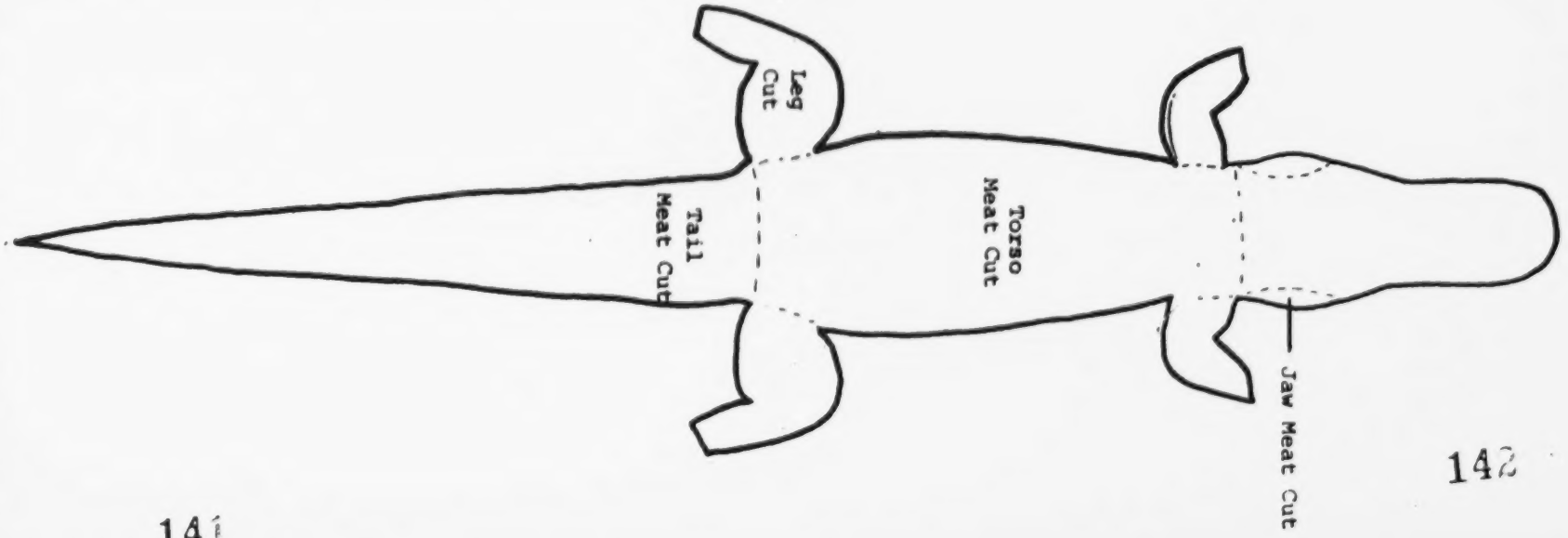
_____
Name of Person Making Declaration

Social Security #_____

Date:_____

Percentage Yield on a Live Weight Basis

Size	Dressed wt., head-on	Skin, feet and viscera	Tail	Deboned Tail meat	Leg	Deboned Leg meat	Torso	Ribs	Deboned Torso meat	Jaw meat
Small	81	24	21	16	7	4	26	10	6	-
Medium	74	24	20	17	8	5	29	7	13	1
Large	74	27	21	17	8	5	30	8	12	2
Extra Large	72	27	20	16	8	5	32	3	21	3



THE FOUR CUTS OF ALLIGATOR MEAT

UNIT VII
DEVELOPING ECONOMIC RETURNS TO THE LAND OWNER FROM WILDLIFE MANAGEMENT

INTRODUCTION

Hunting, once a necessity and now a fulfillment, is a heritage becoming more difficult to enjoy. Development, intensive use and other necessary ills of our over-populated society are closing the door to hunting on thousands of acres each year. Private farm lands, perhaps our richest areas of game production, are being closed to hunting at an alarming rate. Why? The pattern of American agriculture for the past decade, and longer, has been progressing toward more mechanization on greater number of acres. Intensive agriculture demands careful management, and the poor conduct of a few hunters often interferes with this management, forcing landowners to exclude all hunters from their land.

In order to produce a significant amount of wildlife on lands being farmed intensively, a carefully designed wildlife management plan is necessary to provide adequate habitat. Not that wildlife habitat is difficult to establish. On the contrary, if left alone nature does an excellent job. Evidence of this is the wildlife abundance associated with non-intensive "pea-patch" type agriculture prevalent at the turn of the twentieth century. However, use of most agricultural acreage today needs economic justification. Wildlife management on such lands has to make best advantage of crop harvest wastes and small untillable field corners, turn-around areas, etc.

To many, this kind of wildlife management can be justified by the spiritual enrichment and beauty of its product. To others, it need be justified economically.

The purpose of this unit is to show that careful wildlife habitat planning on today's agricultural lands can yield extra farm income, and that through fee-hunting, the landowner has sufficient control to protect himself and his property from vandalism of disrespectful hunters.

GENERAL PERFORMANCE OBJECTIVES/GOALS

Upon completion of this unit, students should be able to:

1. List items pertaining to wildlife management for economic returns.

2. Explain resource and economic benefits derived from wildlife management for economic returns.

3. List factors related to developing a hunting lease enterprise.

4. Select proper legal considerations for operating a hunting lease operation.

SPECIFIC PERFORMANCE OBJECTIVES AND MASTERY CRITERIA

1. Given a list of terms pertaining to wildlife management for economic returns, students will be able to match or define terms correctly with at least 75% accuracy.

2. Given a written exam, students will be able to explain resource and economic benefits derived from wildlife management for supplementary farm income with at least 75% accuracy.

3. Given a written exam, students will be able to list factors related to a hunting lease enterprise with aspect to landowner and hunters' rights with at least 75% accuracy.

4. Given a list of statements related to farmers' liability considerations in a hunting lease, students will be able to select correct considerations with at least 75% accuracy.

METHODOLOGY

The information can best be presented by discussion in the classroom and using resource persons such as farmers who have been leasing and lawyers to answer liability questions.

SUGGESTED APPROACHES

1. Plan field trips to several different farms that have been leasing for wildlife hunting. Students can ask farmers about benefits and problems.

2. Have students do outside research, have each student locate a farm that is leasing for wildlife and report to the class such things as size, kind of wildlife and amounts of lease.

UNIT OUTLINE

I. Economic and Aesthetic Values of Wildlife

A. Meaning of wildlife

B. Value to farmers

C. Value to economy

II. Resources, Economic and Benefits from Wildlife Management

A. Waterfowl leases and their value

B. Factors that affect waterfowl lease value

III. Develop a Hunting Lease Enterprise

A. Understanding the meaning of lease, rights of landowner and hunter

B. What makes a successful hunting lease

C. Written lease contracts, long and short terms, sub-lease

IV. Legal considerations for operating hunting lease

A. Wildlife ownership

B. Landowner liability

SPECIFIC PERFORMANCE OBJECTIVES AND LEARNING ACTIVITIES

OBJECTIVE 1. Given a list of terms pertaining to wildlife management for economic returns, student will be able to match or define terms correctly with at least 75% accuracy.

UNIT CONTENT

Definitions:

A. Wildlife - those creatures living in the woods, prairies, and streams without being closely directed or controlled by man.

B. Aesthetic Value - the value or pleasure that wildlife gives to individuals by its presence.

C. Economic - having to do with the management of the income and expenditures of a household, private business, community, or government.

D. Ecology - derives from a Greek word meaning the study of the home.

The term "wildlife" has different meanings to different people. The term is used in this unit to include those creatures living in the woods, prairies, and streams without being closely directed or controlled by man. It is difficult to determine the specific dollar value of all wildlife to the economy, but the following information reveals that it is of great economic value. Recent figures released by the U. S. Fish and Wildlife Service show that almost 96 million Americans, about one-half of the population nine years of age and older, participated in one or more forms of wildlife-related recreation during 1975. In a telephone survey of 106,000 households and the completion of an additional 20,000 individual questionnaires, it was estimated that there were 20.6 million hunters and 53.9 million anglers in 1975.

The presence of certain wildlife species has increased the demand for and value of land. In a study conducted in Brazos County, Texas it was determined that a low deer density (one deer to 20-30 acres) increased the value of land $10.00 per acre, while a high deer population (one deer to 1-10 acres) increased land value as much as $50.00 per acre.

Wildlife has tremendous economic influence on the state and nation. Consider the amounts spent for equipment, ammunition, hunting leases, fishing rights, transportation, lodging, bait, boats, motors, and other items used in activities related to wildlife.

The aesthetic value of wildlife is even more difficult to determine than the actual economic value. People do enjoy seeing the different forms of wildlife and appreciate its presence. Evidence of this fact is presented in the national survey which stated that 49 million people in the U. S. last year reported they spent time observing wildlife.

The term "ecology", derives from a Greek word meaning the "study of the home". There is considerable interest by government leaders and others in cleaning up our environment to make the world a better place to live. Ecology and environment are closely related and influence the lives of

humans as well as wildlife. Ecologists define the relationship between the ecology and environment as in interrelationship of living organisms and their environment.

LEARNING ACTIVITIES

1. Arrange for a wildlife person to speak to your class on economic and aesthetic values of wildlife.

OBJECTIVE 2. Given a written exam, students will be able to explain resource and economic benefits derived from wildlife management for supplementary farm income with at least 75% accuracy.

UNIT CONTENT

When large numbers of waterfowl begin wintering, waterfowl hunters soon follow. As all of the rice land was privately owned, commercial hunting operations and clubs formed in order to gain access to land where waterfowl could be hunted. This involved cash payments to the landowners in return for hunting rights and land leases. There has been a steady trend toward organized commercial waterfowl hunting in this state for many years.

There are many factors that affect the value of a piece of land as a waterfowl lease. These include numbers of birds, roosting water, protection from disturbance, waterfowl feeding areas, size of the lease, land-use patterns, location, privacy, access, and hunter facilities.

Water is the most critical element on any waterfowl lease in this area. The ability to control water on the lease is a great benefit that comes almost naturally with rice lands due to the intensive water management required in successful rice farming. The series of contour levees, overflows, drainage ditches, and water supply laterals makes water control on rice land much easier than on other agricultural lands. The value of your lease will be directly related to how much water is present, in both numbers of ponds and total acreage.

The present land-use pattern, crops, pasture, and/or plowed ground, and the acreage of each will affect the value of your lease. Rice stubble is the name of the game as far as waterfowl leases go. This has become even more

true with recent U. S. Department of Agriculture's rice acreage reduction programs which have effectively reduced rice acreage by over 330,000 acres since 1980. Research has documented the value of rice field to wintering waterfowl and the important role these fields play in providing quality wintering habitat for these birds.

If your property is located anywhere inland from the coastal marshes, the value of your property as a waterfowl lease will be affected by the rice acreage you have and/or that surrounding you. Naturally, a 200-acre rice field miles from any other rice will be less valuable than a 200-acre rice field surrounded by other rice fields.

The geographic location of your land will affect the price you are able to obtain for it. Although this is a factor you have no control over, it is good to be aware of both the positive and negative features of your land so that realistic decisions can be made. If your land is located close to a major metropolitan area, then you have the ability to wait for hunters who will meet your price. However, if your land is located quite a ways from the nearest big city, your options may be reduced simply because the numbers of interested hunters are not there to create enough demand to support your price.

Landowners can generate thousands of dollars of added revenue each year by leasing their land to waterfowl hunters. This money is an important supplement to agricultural income. Leasing is an important incentive that through cash payments encourage landowners to preserve wintering-ground habitat, improve existing habitat, and even create new hunting areas.

Waterfowl hunting is big business. Waterfowl hunters bring millions of dollars into local economies as they pay for day-hunting privileges, season leases, food, lodging, gasoline, hunting supplies, and commercial bird processing. Landowners can greatly increase their income and the economic stability of their community through waterfowl hunting.

LEARNING ACTIVITIES

1. Prepare a bulletin board showing the potential areas that would make a good waterfowl lease.

2. Collect data on locally owned waterfowl leases (prices, pictures, acreage, etc.).

OBJECTIVE 3. Given a written exam, students will be able to list factors related to a hunting lease enterprise with aspect to landowner and hunters' rights with at least 75% accuracy.

UNIT CONTENT

Definitions:

A. Lease - a contract by which one part gives to another the use and possession of lands, buildings, property, etc. for a specified time and for fixed payments.

B. Accessibility - a means of being able to approach or obtain something easily.

C. Attractability - something that attracts or has the power to attract; it's pleasing, charming, pretty, etc.

D. Enterprise - a business venture or company.

Management of wildlife on private lands can become an economical enterprise within certain constraints. The right to control access to private land is a property right of the landowner. He/she can transfer this right of ingress to whomever he/she desires by gift or sale subject to any conditions which he/she wishes to impose. Allowing an individual access to one's property for a fee in order to hunt is the basis of a hunting lease enterprise.

The first step in the development of a hunting lease enterprise is a good understanding of what is offered for sale. Access to land for recreational hunting is the crux of the enterprise, but a successful enterprise encompasses more than just access. Providing opportunities for pleasant out-of-doors experiences for individual hunters is the business.

The key to success for an individual landowner, a parish, or a region in developing wildlife enterprises, is understanding that the hunters must have a "good time" while on a hunting trip. Hospitality goes a long way. A friendly attitude, a sense of welcome and a conviction on the part of the hunter that he/she is not a problem or that he/she is not being criticized for a lack of "savvy" are things which cost little but give big returns.

Good communication will prevent many problems. Rules are necessary to protect people and property, but the rules should be kept as few in number as possible. The rules should be written down and agreed upon prior to making a lease contract. A written lease contract is an excellent means of communicating those things that are important to the farmer and the hunter. The process of writing out the lease agreement will prevent many problems from ever developing.

When developing a waterfowl enterprise on marsh acreage there are five main factors one should consider. They are: (1) Location, (2) Size, (3) Accessability, (4) Attractability, (5) Food Availability.

The point is that purchasing a hunting lease for most hunters is investing in an opportunity for a pleasant experience, not the purchase of a commodity. Management of the hunting lease enterprise to assure that the customer has a pleasant experience is the key to successfully dealing with hunters.

LEARNING ACTIVITIES

1. Students will take a field trip to a locally owned waterfowl lease to observe and discuss the waterfowl site.

OBJECTIVE 4. Given a list of statements related to a farmer's liability considerations in a hunting lease, students will be able to select correct considerations with at least 75% accuracy.

UNIT CONTENT

Definitions:

A. Liability - anything for which a person is liable.

B. Negligence - law failure to use a reasonable amount of care when such failure results in injury or damage to another.

C. Corporations - a group of people who obtain a charter granting them, as a body, certain legal powers, rights, privileges, and liabilities.

D. General Partnership - a judicial person, distinct from its partners, created by a contract between two or more persons to combine their efforts or resources in determined proportions and to collaborate at mutual risk for their common profit or commercial benefit.

E. Sole Proprietorship - ownership of a business by one person.

Wild animals roaming about the countryside, traversing private as well as public lands; wild birds flying free of any restraint, landing where they may, whether on public or private property are all "public things." These animals are owned by this country in its sovereign capacity for the benefit of its people.

Louisiana law allows a landowner to restrict entry onto the land he/she owns. Likewise, a leasee can exclude anyone and everyone from the leased premises except for the landowner. A hunting club, if it is leasing the land or owns the land, can restrict entry onto the land it controls. The hunters, though, must still comply with the applicable wildlife laws, such as take and possession limits, seasons, and licensing. The club cannot limit access, such as a public servitude or navigable waterway, even if the owner controls or owns the land on both sides.

One method a landowner has to limit hunting is by controlling access to his/her land. Full control over access requires that the land is properly posted. Once posted, any intentional unauthorized entry is considered trespassing (except for emergency and unarmed retrieval of a dog). Trespassing is a misdemeanor criminal offense that is punishable by a fine of not more than $500 and/or imprisonment up to ninety-one days. Conversely, if the land is not properly posted, unauthorized entry does not constitute trespass.

Anyone who leases out his/her land for hunting or forms a club or other organization for such purpose can, in certain situations, be subject to legal liability.

Before discussing the specific situations in which a landowner can be liable it is necessary to define the concept of negligence, as it is central to landowner liability. Negligence is most often defined as the ordinary care that a prudent person would take to prevent harm from occurring to another to whom he/she is obligated to protect. A person is generally liable in those situations for an act which results in injury or damage to the person or property of another. Whether a person falls below this standard of care is a question of fact and is usually determined in court, by a jury.

In determining whether a landowner is liable in a given situation, the relationship between the landowner and the person claiming injury must be determined. A person on the landowner's property can be classified as: (1) an invitee, (2) a licensee, or (3) a trespasser. This is listed in decreasing order of the amount of duty each is owed by the landowner. In other words, the landowner owes a higher degree of responsibility to protect an invitee from dangers or defects on the property than a licensee, and the landowner owes the least amount of responsibility to a trespasser.

For all practical purposes, liability insurance is a necessity. Liability for hunting lease enterprises provides liability coverage for the hunting club leasee and covers the landowner as well. The insurance normally provides for coverage of the hunting club and the landowner against claims resulting from injuries to third persons.

In most cases it is a good idea to have a written lease between the landowner and the leasee (hunting club or other group or person). The purpose of the lease is to set out the rights and responsibilities of both parties. Because each lease is different it is impossible to provide all the possible provisions. A few provisions that should be included, or at least considered by the landowner, are:

1. Duration of the lease.

2. Specific location of the leased premises, including pay.

3. Time period during which hunting may occur on the property. For example, only during daylight hours or, better, only between official sunrise and official sunset.

4. The number of persons that are allowed to hunt on the property at one time.

5. Prohibition of certain types of guns, vehicles, or other equipment. Since insurance would likely exclude injuries from use of ATV's, the landowners may want to prohibit their use.

6. Waiver of liability. This provision provides that the leasee or hunter assumes all risks while on the property and indemnifies and holds the owner harmless from all liability. This provision is not completely effective but it may give some protection to the landowner. Generally, these types of waivers are considered against the concept of civil law. This is particularly true if the injured party paid to use the property.

Hunting leases can often be organized to help eliminate liability to other hunters in the group. Several organizational methods are used. Business organizations can normally be formed as corporations, partnerships or sole proprietorships. The term "corporation" eludes to a precise definition in both the federal tax code and everyday life. A corporation can best be characterized by what it does. It is a form of carrying out business operations. There is no specific structure or organization that must be adhered to during formation. Rather, innumerable variations are possible in setting up the corporation, so long as these variations fit within statutory norms. Louisiana regulates corporations by setting minimum structural requirements. These include such things as filing requirements, corporate name, number of meetings, number of required directors, and such as the purposes, number of officers and directors, voting procedures, and classes of shares can be tailored to meet the needs of the business.

A partnership arrangement is often used to organize hunting groups. Under Louisiana law, partnership is defined as a judicial person, distinct from its partners, created by a contract between two or more persons to combine their efforts or resources in determined proportions and to collaborate at mutual risk for their common profit or commercial benefit.

A sole proprietorship is, simply, ownership of a business by one person. It is the simplest to organize and operate. The proprietorship is the prevalent type of hunter organizational system in existence.

LEARNING ACTIVITIES

1. Students will develop a waterfowl lease with consideration to the previous material covered.

UNIT VII TEST

I. Match the following:

_____ Value or pleasure that wildlife gives to an individual

_____ Study of the home

_____ Creatures living in the woods, prairies, and streams without being closely directed by man

_____ Management of the income, expenditures, of a household, private business, community, or government

_____ Contract by which one party gives to another the use and possession of lands, buildings, property, etc. This is generally for a specified time and for fixed payments

_____ Means of being able to approach or obtain something easily

_____ Something that attracts or has the power to attract

_____ A business venture or company

_____ Anything for which a person is liable

_____ Law failure to use a reasonable amount of care when failure results in injury or damage to another

_____ Group of people who get a charter granting them as a body certain of the legal powers, of an individual distinct from those of the individuals making up the group

_____ Judicial person distinct from it partners, created by a contract between two or more persons to combine their efforts or resources in determined proportions and to collaborate at mutual risk for their common profit benefit

_____ ownership of a business by one person

a. liability

b. wildlife

c. ecology

d. sole proprietorship

e. economic

f. negligence

g. general partnership

h. aesthetic value

i. corporations

j. enterprise

k. lease

l. accessibility

m. attractability

2. Name five of the ten factors that effect the value of a waterfowl lease.

3. What is the best way of communicating those things that are important to the farmer and the hunter when a lease is being handled?

4. True or False

_____a. Louisiana law allows a landowner to restrict entry onto the land he owns.

_____b. The first step in the development of a hunting lease enterprise is the attractability of the lease.

_____c. Not everybody who leases out his/her land for hunting is subject to legal liability.

_____d. Liability insurance for hunting lease enterprises provides liability coverage for hunting club only.

_____e. The aesthetic value of wildlife is even more difficult to determine than the actual economic value.

5. When developing a waterfowl enterprise on marsh acreage there are five main factors one should consider, list them?

UNIT VII TEST
ANSWER KEY

1. h
   c
   b
   e
   k
   l
   m
   j
   a
   f
   i
   g
   d

2. number of birds, roosting waters, protection from disturbance, waterfowl feeding areas, size of the lease, land-use patterns, location, privacy, access, hunter facilities

3. a written lease contract

4. T
   F
   F
   F
   T

5. location, size, accessibility, attractability, food availability

EVALUATION AND TESTING

Ways to Evaluate Pupil Growth

Class participation
Unit test
Students demonstrating skills

EQUIPMENT AND SUPPLIES

Student

Reference materials
Notebook

Teacher

Reference material
Slides of waterfowl sites
Developing techniques
Slide projector
Wildlife person for appearance in class

Bulletin Board Ideas

Prepare a bulletin board using reference materials listed in the supplementary section of this lesson.

SUPPLEMENTARY MATERIALS

Reference Booklets

Coreil, D. Paul. Developing A Waterfowl Hunting Enterprise on Marsh Acreage. Louisiana Cooperative Extension Service, Cameron and Calcasieu Parishes.

Fowler, F. James. Developing a Hunting Lease Enterprise. Wildlife Specialist.

Increasing Farm Income Through Wildlife Resources. Fowler, F. James, Wildlife Specialist.

Legal Considerations for Operating A Hunting Lease Enterprise. Whitrock, C. Fredrick, Sea Grant Legal Program, Louisiana Sea Grant College Program, Louisiana State University.

Liability Considerations In Waterfowl Leasing. Schofield, Z. Douglas, Southeastern Wildlife Federation, Montgomery, Alabama.

The Business of Waterfowl Hunting on Agricultural Lands in Southwest Louisiana. Shirley, G. Mark, Associate County Agent, Vermilion Parish.

Waterfowl Hunting Leases: Resources, Economics, and Benefits. Hobaugh, C. William, Ph.D., Wildlife Management Consultant and General Manager.

UNIT VIII
MANAGEMENT OF FARM PONDS FOR SPORT FISHING

INTRODUCTION

It is estimated that there are over one million ponds in the United States that are used for recreational and sport fishing. Many of these ponds are used for fishing while others provide a means of irrigation, swimming, and water for livestock. More effective use of the farm pond results when it is properly constructed, maintained efficiently, and properly managed.

Ponds properly constructed, stocked with the correct kind and number of fish, adequately fertilized, and properly managed will provide wonderful fishing to those willing to follow the recommended practices. Fishing, whether for livelihood or for sport is a great American heritage that dates back hundreds of years. Millions of people enjoy the sport of fishing. The private pond or farm pond which is well managed has produced two to three hundred pounds of catchable size fish annually per acre. An additional note of interest is that some of the largest largemouth bass caught in Louisiana came from farm ponds.

COMPETENCIES

To construct, stock, and manage farm fish ponds in Louisiana.

GENERAL PERFORMANCE OBJECTIVES/GOALS

Upon completion of this unit, students should be able to:

1. Identify factors to consider in the pond site selection.
2. Identify factors to consider in pond construction.
3. Identify factors in reconditioning of old ponds.
4. Identify factors influencing the stocking of ponds, fertilizer requirements, and fishing or harvesting the pond.
5. Determine proper situations for manipulating fish populations.

6. Identify proper techniques for the solution of problems in management of farm ponds.

SPECIFIC PERFORMANCE OBJECTIVES AND MASTERY CRITERIA

1. Given a written exam of factors to consider in pond site selection, students will be able to identify or give meaning to factors with at least 75% accuracy.

2. Given a written exam on factors to consider in pond construction, students will be able to identify or give meaning to those factors with at least 75% accuracy.

3. Given a written exam on factors in reconditioning of old ponds, students will be able to identify and give meaning to such factors with at least 75% accuracy.

4. Given a written exam on factors influencing stocking of ponds, fertilizer requirements and fishing or harvesting the pond, students will be able to identify or give meaning to such factors with at least 75% accuracy.

5. Given situations dealing with manipulating fish populations, students will be able to determine which situations are proper for manipulating desirable fish populations with at least 75% accuracy.

6. Given a list of problems and solutions in management of farm ponds for sport fishing, students will be able to identify proper techniques for the solution of such problems with at least 75% accuracy.

METHODOLOGY

This unit should be presented by a combination of methods. Instruction should include a field trip to a fish pond, providing and examining several species of fish used in ponds, observation and open discussion in a classroom setting, utilization of resource personnel, and classroom lecture.

SUGGESTED INTEREST APPROACHES

1. Plan field trip to a farm pond, sporting goods store, or fish hatchery to observe and discuss techniques and procedures being used in the maintenance and harvesting of sport fish.

2. Secure several species of sport fish for a classroom demonstration.

3. Contact resource personnel from the extension service, Soil Conservation Service, and/or wildlife and fisheries service for classroom presentation.

4. Point out to students on the recreational advantages a properly managed farm pond has to offer.

UNIT OUTLINE

I. Introduction

II. Pond Site Selection

- A. Location
- B. Size - Depth
- C. Water supply
- D. Soil requirements

III. Pond Construction

- A. Clearing the site
- B. Levee building and drain layout
- C. Spillway
- D. Controlling erosion

IV. Reconditioning Old Ponds

- A. Controlling excess water
- B. Improving on original design

V. Stocking Ponds

- A. Availability of fish

B. Correct stocking rates and species to select

C. Fertilization

D. Fishing or harvesting the pond

VI. Manipulating Fish Populations

A. Determining balance

B. Maintaining balance

VII. Possible Problems and Solutions

A. Water quality

B. Controlling nuisance animals

C. Controlling mosquitoes

D. Fish diseases

E. Weed control

SPECIFIC PERFORMANCE OBJECTIVES AND LEARNING ACTIVITIES

OBJECTIVE 1. Given a written exam of factors to consider in pond site selection, students will be able to identify or give meaning to factors with at least 75% accuracy.

SUBJECT MATTER CONTENT

A. Location

1. Make sure the soil in the proposed site will hold water.

2. The best sites are often located in small depressions, valleys, or wet boggy locations.

3. A good water supply must be available.

4. Locate the pond where it will provide maximum use.

5. If the watershed is providing a water supply for livestock, a good vegetative cover to reduce siltation of the pond is necessary.

6. Utilize the topography of the land to permit easier, less expensive construction.

B. Size and Depth

1. Pond should be limited to an area of 1-3 acres, but may vary in size from 1/4 acre to 50 acres.

2. A minimum of 4 feet of water over most of the pond should be maintained during periods of prolonged drought. A maximum of 6-8 feet should be provided.

3. Extremely deep water is not necessary.

4. Very shallow water encourages troublesome aquatic weed growth.

C. Water Supply

1. Should be of sufficient quantity to keep the pond filled.

2. An excessive amount of water is undesirable and results in an unmanageable pond.

3. Water fluctuations may be desirable at times, but should be the result of a management procedure.

4. Spring or well water may be saturated with carbon dioxide and iron with very little dissolved oxygen. Aeration of this water would be necessary to reduce C02 and increase 02.

D. Soil Requirements

1. There must be enough clay in the soil to provide a watertight seal in the basin proper of the pond and between the basin and the levee.

2. Soil test should be made if there is concern as to the quantity and availability of clay in the area.

3. Using a plastic or rubber membrane can be used to seal a pond if a lack of clay exists. These membranes are rather expensive and require at least 6-12 inches of soil covering.

LEARNING ACTIVITIES

1. Visit various possible pond sites and discuss whether they would make good or bad sites.

2. Show charts concerning pond depths to class.

3. Do experiments on different soil types containing various amounts of clay in order to show a difference in the water holding capacity of each soil.

OBJECTIVE 2. Given a written exam on factors to consider in pond construction, students will be able to identify or give meaning to factors with at least 75% accuracy.

SUBJECT MATTER CONTENT

A. Clearing the Site

1. After choosing the most suitable location, all trees, shrubs, branches and other debris must be cleared. Mark off the area to be flooded and begin construction of the levee. By clearing the pond site you destroy breeding places for mosquitoes, snakes and other undesirable animals and make fishing easier.

B. Building the Levee and Drain Layout

1. Clear the pond site of trees, underbrush, and heavy vegetation.

2. Area where levee is to be constructed should be dressed down to a depth of at least one foot below surface. This will ensure a good seal between pond basin and base of levee.

3. A core trench should be dug and filled with a sticky clay the entire length of the levee. The core trench should be 10 feet wide and extend three feet or more into the subsoil.

4. Dig a trench for drainpipe with a gate or shear valve so water may be lowered or completely drained. The pipe should be made of a nondestructive material. The diameter of the pipe is dependent on the size of the pond. Example 1-3

acre ponds need a 4" pipe; ponds 4-8 acres need a 6" pipe; ponds 9-12 acres need a 8" pipe; ponds over 12 acres require a 12" pipe to allow water to drain rapidly. The pipe should be installed after the core trench is filled with clay to the intended position of the pipe. The levee may then be constructed by placing many thin layers of clay and compacting each layer with heavy machinery. The height of the levee depends upon the location of the pond and amount of water the pond will hold. Earth should be scooped around the center mold and be shaped to allow gentle sloping sides. The top of the levee should be at least 8 feet wide. The pond sides should have a run of 3 feet for every 1 foot in rise as illustrated on the cross-sectional view of a levee.

C. Spillway

The size and design of the spillway is very important because it is the safety-valve protecting the levee. The spillway must be large and wide enough to carry away all excess water even in times of heavy rainfall. Use natural spillways when available. The use of screens is necessary to prevent the escape of fish.

D. Controlling Erosion and Seepage

1. Permanent vegetative cover protects the watershed area from erosion and ensures a long life of the pond and successful fishing. Vegetative cover guards against erosion and prevents ponds from filling up with silt. When silt gets into a pond in large amounts, the water becomes undesirable becoming muddy and is unsuitable for fish and/or livestock. Croplands, hayfields, pastures, woodlands and roads are likely to be in the watershed area. Soil conservation should always be practiced to control soil erosion.

2. Seepage of a new pond is likely until the levee settles. Should ponds continue to seep or leak through the levee, further loss may be prevented by the use of bentonite, a volcanic clay. This clay is a good sealing compound. To use simply drain the pond to a point below the leak or seepy area. Then thoroughly loosen the soil around the trouble spot. Mix 1/2 to 2 lbs. of bentonite per square foot of land surface. Pack this mixture tight and refill the pond with water. Bentonite being a clay-like substance will swell several times its original volume when it becomes saturated with

water. This should stop leaks. If further leaks occur, it may be necessary to drain the pond and cover the water side of the levee as well as a portion of the adjacent pond basin with a generous layer of clay.

LEARNING ACTIVITIES

1. Give handouts on the layout pattern for building a levee, a good farm pond, and the crossectional view of the levee. Discuss each handout with students.

2. Have a resource person from the Soil Conservation Service give a presentation to class concerning levee building for fish ponds.

OBJECTIVE 3. Given a written exam on factors in reconditioning of old ponds, students will be able to identify and give meaning to such factors with at least 75% accuracy.

SUBJECT MATTER CONTENT

A. Controlling Excess Water

Well managed ponds can produce suitable fish, but unfortunately many ponds cannot be well managed. This is usually the case with old ponds that were poorly constructed or improperly designed. It is important to have a pond which will permit you to control water. The reconditioning of old ponds is usually a matter of a structural change or adaptation which will give the necessary control and provide the maximum benefit to the fish population. Most problems concerning proper management can be corrected and these ponds can be made to produce good fishing if these things are possible:

1. The water entering the pond can be controlled;

2. The original design can be improved to permit water level control;

3. The spillway can be altered to protect the levee;

4. The edges can be deepened to allow weed control;

5. The area can be fenced to exclude livestock. Controlling excess water can be accomplished by diverting the extra water away from the pond. If the watershed area supplies too much water for the pond, drain the excess away through a diversion ditch.

B. Improving on original design may be accomplished by many methods. Many ponds have been built without a drain or outlet. This makes water control very difficult. Installing a drain or outlet lets you better control the water level of your pond and thus makes it more productive. The spillway needs to be large enough to carry away excess water when periods of heavy rainfall exist. Deepen the pond shallow areas to a depth of more than 3 feet. Ponds with shallow edges produce poor fishing after a few years. Weed infestation contributes toward poor fishing by providing hiding places for small bluegill which leads to overcrowding and stunted fish. The pictured view of a shallow pond with improved and deepened sides is included. The best time to work on the pond is during late summer after spawning has been completed.

LEARNING ACTIVITIES

1. Discuss proper techniques on reconstruction of old farm ponds.

OBJECTIVE 4. Given a written exam on factors influencing the stocking of ponds, students will be able to identify those factors with at least 75% accuracy.

A. Availability of Fish

The State of Louisiana operates and maintains three fish rearing stations for the production of warm water fish. These hatcheries are located near Monroe, Forest Hill, and Lacombe, Louisiana. The James A. Noe Hatchery north of Monroe produces largemouth bass and bluegill for pond stocking. The Beechwood Hatchery north of Forest Hill produces largemouth bass and bluegill. The Huey P. Long Hatchery at Lacombe produces striped bass for coastal waters. To obtain fish for stocking purposes, send a card or letter to Louisiana Wildlife and Fisheries Commission, P. O. Box 278, Tioga, Louisiana 71477. You will be sent an application for fish. After you complete the form, return it to the above address and

your name will be placed on the list to receive fish. You will be notified prior to their delivery date.

B. Correct Stocking Rates and Species to Select

A fish pond should be stocked with the right kinds and amounts of fish for the size pond you have. Warm water ponds can be managed for largemouth bass, bluegill, redear sunfish, catfish or bait minnows. The most common kind of fish stocked are largemouth bass with bluegill or bream. Bass are a predacious fish and are necessary to keep the bluegill population down. Bluegill or bream, as they are commonly called, are mainly insect feeders. They have a long spawning season usually April through September. Channel catfish is sometimes stocked with bass and bluegill, but they often compete for food and space. Catfish do not readily spawn in such ponds and must be restocked as needed. Stocking catfish in extremely small ponds should be avoided. Channel catfish are becoming increasingly accepted as a desirable species for sport fishing ponds. However the state is not currently supplying catfish for stocking. Consequently a pond owner who chooses to stock catfish would have to buy fingerlings from a commercial producer and depending upon natural food availability, commercial feeds (catfish pellets) may be needed to supplement natural foods. Your county agent or SCS office can tell you where to get fish for your pond. Following instructions in transportation and handling of fish from the hatcheries insures good survival and condition of the stocking fish. Elimination of wild fish is extremely important before stocking occurs. If you cannot drain your pond, you may use a chemical to kill fish. Rotenone is commonly used but you may want to contact the state fish and game agency for recommendations and amounts of chemicals to use and possible regulations that may apply.

The usual stocking rate is a ratio of 10 bluegill for every bass. This rate is based upon previous research work and is recommended for using ponds throughout the Southeastern United States. The number of fish stocked depends on the fertility of the individual pond. In fertilized ponds the prescribed stocking rate is 1000 bluegill and 100 bass per surface acre of water. Unfertilized ponds of average fertility should be stocked with 500 bluegill and 50 bass per surface acre. Catfish in a bass-bluegill pond should be stocked at a rate of 100-200 per surface acre. You should know the pond size to the nearest one-tenth acre. This is important for two reasons: (1) Not to under or over stock, which could result in an unbalanced fish

population; (2) To know how much fertilizer to apply. Fertilization is a very important part of pond management.

C. Fertilization

Fertilization is a very important tool in pond management. Natural waters, as a rule, generally have low to moderate fertility. To achieve good fish populations, ponds usually need the addition of commercial fertilizers. Once commercial fertilization is started it should continue during the growing season. Proper fertilization can increase your pounds of catchable fish per year. Fertilization increases growth of microscopic plants upon which worms, insect larvae, and other aquatic animals feed upon. Fish eat insect larvae, worms, and other aquatic animals. Bigger fish feed on smaller fish. High fertility also prevents the growth of submersed water weeds. With the proper fertilization rates, millions of microscopic plants color the water to a depth of 12-18 inches and prevents sunlight from reaching the pond bottom. Weeds cannot grow without sunlight.

Fertilization should begin during the first warm weather of early spring and continue during the summer and fall. Applications should be made at biweekly intervals and continue until the water is colored by the growing plankton. This color should be dense enough to obscure a bright object when immersed to elbow depth. After the desired color is reached, additional applications of fertilizer may be discontinued until water begins to clear.

There are various mixtures of commercial fertilizers readily available and suitable to use in your pond. Best results have been obtained with an 8-8-8 formulation. For each application of fertilizer use 100 pounds of 8-8-8 per surface acre. Some ponds will need only a few applications of fertilizer while others will require as many as 12. On the average, ponds of medium fertility will require 4-6 applications per year for maximum production. Let the color of your water be your guide. The fertilizer may be broadcast by hand or you can use a boat and pour the fertilizer over the bow. You should avoid pouring fertilizer into water with a depth of over five feet. Shallow waters should be covered with each application of fertilizer. Organic fertilizers should be avoided.

Lime may need to be added in order to achieve an effective fertilization program. If proper water color cannot be obtained or maintained using recommended applications, liming may be necessary. Lime requirements can be determined by your county agent, soil conservation service or state fisheries biologist. Most ponds require application of at least 1 ton of agricultural lime per acre every three to four years and should be applied in the same manner as fertilizer. Generally speaking fish do best in a pH ranging between 6.5-9.0.

D. Fishing or Harvesting the Pond

Fishing during the first year after stocking should be avoided. The second year after stocking a properly managed pond, the fishing pond will contain its maximum pounds of fish. Growth of fish is stimulated only as you harvest the crop. To get the best fishing, take about 5 pounds per acre per week from March through November. If you catch too many small fish of a certain species, don't throw back the ones you catch. The ones you don't catch will grow faster. If you catch a fish large enough to eat, do so, this is good pond management.

LEARNING ACTIVITIES

1. Discuss factors influencing the stocking of ponds.

2. Discuss proper fertilization rates in fish ponds.

3. Discuss fishing or harvesting the pond.

OBJECTIVE 5. Given situations dealing with manipulating fish populations, students will be able to determine which situations are proper for manipulating desirable fish populations by at least 75% accuracy.

Factors which influence fishing success in ponds with an existing fish population. These are obvious reasons for pond failing:

1. Stocking with species of fish not desirable.

2. Extensive mortality in the initial stocking.

3. Overstocking of bass or bluegill.

4. Mortality caused by chemical combination or toxin.

5. Loss of fish through structural failure of the pond.

A. Determining Balance

A pond is said to be balanced if it produces good fishing annually. Balance is the interrelationship between species of fish and their food supply. Fish populations are balanced if they produce yearly crops of catchable fish. To make this possible, it is necessary for the species to produce annually in order to replenish their numbers and replace fish that are caught. Both bluegill and bass need to be present in the pond in sufficient numbers to create this condition. The bass serve as a control for the bluegill population, but allows a certain number to grow to larger fish. This ensures plenty of food for both the bluegill and bass populations. Catfish must be restocked because spawning does not successfully occur in open ponds.

B. Maintaining Balance

The best way to maintain balance is by fishing. Balance may be checked by taking a sample of the pond by using a minnow seine. The seine sample should contain a few intermediate bass and bluegill, bass fingerlings and many newly hatched bluegill in order to be balanced.

LEARNING ACTIVITIES

1. Discuss how balance in your fish pond is determined.

2. Discuss how balance may be maintained.

OBJECTIVE 6. Given a list of problems and solutions in management of farm ponds for sport fishing, students will be able to identify proper techniques for the solutions of such problems with at least 75% accuracy.

A. Water Quality

Water Quality--muddy water in a pond may be caused by the following conditions:

1. Kind of soil.

2. Muskrats, nutria, or bottom feeding fish.

3. Livestock using the pond.

Solutions:

1. Control of muddy water caused by suspended clay particles may be accomplished by application of agricultural gypsum or aluminum sulphate.

2. Trap, kill, or catch nuisance animals.

3. Fence in pond.

Oxygen--all animal life in your pond is dependent on oxygen. Oxygen levels in your pond is lowest at daybreak. Serious oxygen deficiencies occur when decomposing of dead grasses or organic matter occurs. Oxygen deficiencies can also result when 2 or 3 successive days of windless cloudy days occur.

If fish show signs of distress broadcast 50-100 lbs. of superphosphate fertilizer per surface acre. This fertilizer stimulates microscopic plants to give off more oxygen. Aeration of pond water can also add oxygen to pond water.

B. Controlling Nuisance Animals

There are several animals which may cause problems. Animals like beavers, muskrats, and nutria will burrow in the levee and with continued use along with normal erosion and weathering, these areas may cave in and seriously damage the levee. Crawfish, snakes, and turtles may be a problem to the pond if their numbers increase to a point where they may be undesirable or a hindrance to fishing. Turtles will eat fish when they are on a string.

Beavers, muskrats, nutria, and turtles may be trapped to reduce their number. Mowing on the levee makes these animals more visible to predators and thus reduces their numbers. Crawfish may be controlled by placing one teaspoonful of lye or bengenehexachloride (BHC) or creosote in each hole and stepping on the burrow to close it off. Snakes may be discouraged from taking up residence in the pond by removing brush, rocks, or other hiding places around the edge.

C. Controlling Mosquitoes

Mosquitoes are a common pest and an uncomfortable nuisance in Louisiana. By removing trash or other debris floating in the water, breeding places for mosquitoes are reduced. Aquatic weeds growing above the surface of the water also provide good mosquito breeding areas. Effective control of mosquitoes can be accomplished by keeping the edge of the pond clear of trash and other floating debris and by cutting weeds along the pond's edge which also improves the appearance of the pond and makes fishing from the edge easier.

D. Fish Diseases

Fish are constantly exposed to organisms that cause disease. Many disease organisms live on decaying organic matter. During periods of stress such as spawning, oxygen depletions or rapid changes in weather fish may become diseased.

The first step in combating a disease outbreak is to determine the cause. Seek professional assistance through your extension agency or state fisheries biologist.

E. Weed Control

Aquatic weeds are undesirable in a fish pond for several reasons:

1. Provide excessive cover for small fish and overcrowding may occur.

2. Fishing may become difficult.

3. May reduce oxygen levels.

4. Weeds use up nutrients and prevent development of proper water color.

In properly constructed ponds, fertilization is the best control for rooted aquatic weeds. All plants need sunlight to grow. In fertilized ponds with a minimum depth of 3 feet, sunlight cannot penetrate to the pond bottom and rooted aquatic weeds will not become established. Established aquatic weeds can be controlled with herbicides. However, chemical weed control is temporary and a fertilization program is needed in order to prevent reestablishment of these weeds.

LEARNING ACTIVITIES

1. Discuss water quality problems and possible solutions.

2. Discuss nuisance animals and ways to control them.

3. Discuss weed problems and methods of controlling them.

UNIT VIII TEST

1. List 6 considerations in selecting a location for a fish pond.

   a.

   b.

   c.

   d.

   e.

   f.

2. Ponds should be limited to an area of _____ to _____ acres.

3. A minimum of _____ feet of water over most of the pond is necessary during periods of prolonged drought.

4. Shallow water encourages _____.

5. Spring or well water may be saturated with (a) _____ and iron with very little dissolved (b) _____.

6. There must be enough _____ in the soil to provide a watertight seal.

7. What will ensure a good seal between the pond basin and the base of the levee?

8. The top of the levee should be at least _____ feet wide.

9. The use of _____ is necessary to prevent the escape of fish through the drainpipe.

10. _____ guards against erosion and prevents ponds from filling up with silt.

11. _____, a volcanic clay, may be used to stop seepage or leaking through the levee.

12. The _____ function is to protect the levee system of the farm pond by carrying away excess water.

13. How can the shallow edged pond's design be improved?

14. How does weed infestation contribute toward poor fishing?

15. When is the best time to work on the pond? Why?

16. Name three types of fish that are available through the state hatcheries.

17. Farm ponds are commonly stocked with what two species of fish?

18. What type of fish not normally thought of as a sport fish is also stocked in farm ponds?

19. What is the stocking rate of largemouth bass to bluegill?

20. What type of fertilizer should you use in your fertilization program?

21. Fertilization increases growth of _____ upon which worms, insect larvae, and other aquatic animals feeds on these tiny plants.

22. High fertility adds color to the water and this prevents the growth of submersed water _____.

23. Of all commercial fertilizers used, best results have been obtained with a _____ formulation.

24. Generally speaking fish do best in a pH ranging between 6.5-_____.

25. List five reasons for fish pond failures.

    1.

    2.

    3.

    4.

    5.

26. What is the best way to maintain balance in your fish pond?

27. Muddy water may be caused by what?

28. How would you stop muddy water caused by livestock using the pond?

29. When do serious oxygen deficiencies occur?

30. If fish show signs of distress what can one do to increase oxygen levels in the pond?

31. How may mosquitoes be controlled?

32. Why are aquatic weeds undesirable in a fish pond?

UNIT VIII TEST
ANSWER KEY

1. a. Make sure soil will hold water.

   b. Small depressions, valleys, or wet boggy locations make best sites.

   c. Good water supply available.

   d. Locate for maximum usage.

   e. If watershed is used, make sure it has a good vegetative cover.

   f. Utilize topography.

2. 1 - 3 acres

3. 4 feet

4. aquatic weeds

5. a. carbon dioxide

   b. oxygen

6. clay

7. Dressing down the area where the levee is to be constructed to a depth of at least one foot below the surface.

8. 8 feet

9. screens

10. vegetative cover

11. bentonite

12. spillway's

13. By digging out the edges to a depth of 3 feet.

14. Weed infestation contributes toward poor fishing by providing hiding places for small bluegill which leads to overcrowding and stunted fish.

15. During late summer, because spawning has been completed.

16. Largemouth bass, bluegill, and stripped bass

17. Largemouth bass and bluegill or bream

18. channel catfish

19. one largemouth bass to ten bluegill

20. commercial fertilizer

21. plankton or microscopic plants

22. weeds

23. 8-8-8

24. 9.0

25. 1. Stocking with undesirable species of fish

    2. Extensive mortality in initial stocking

    3. Overstock of bass or bluegill

    4. Mortality caused by chemical or toxin

    5. Loss of fish through structural failure of levee

26. by fishing

27. kind of soil, muskrats, nutria or feeding fish, and livestock

28. By building a fence around the pond.

29. When decomposing dead grasses or organic matter occurs or when 2 or 3 successive days of windless cloudy conditions occur.

30. Broadcast 50-100 pounds of superphosphate fertilizer per acre and aeration of pond water.

31. By removing trash or other debris floating in the water, breeding places are reduced.

32. Provide excessive cover for small fish, overcrowding may occur, fishing may become difficult, reduces oxygen levels, weeds use up nutrients.

UNIT VIII
EVALUATION AND TESTING

Ways to Evaluate Pupil Growth

Class participation
Unit test

EQUIPMENT AND SUPPLIES

Student

Reference material
Notebook

Teacher

Reference material
Pamphlets
Overhead projector
Transparencies
Handouts

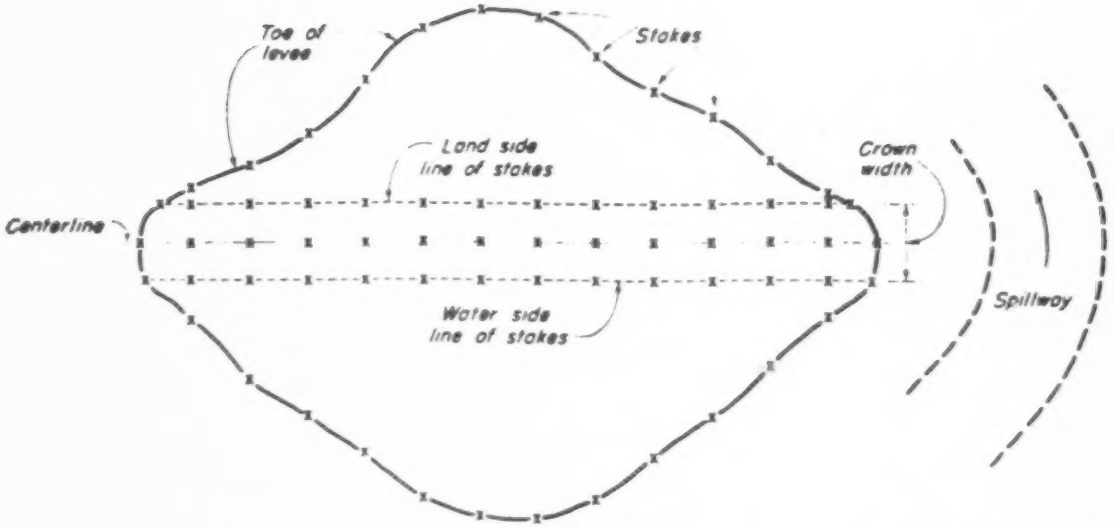
UNIT VIII
SUPPLEMENTARY MATERIALS

Managing Louisiana Fish Ponds. Louisiana Wildlife and Fisheries Commission, 1976.

Warm Water Fish Ponds. Farmers' Bulletin No. 225, U. S. Department of Agriculture, 1978.

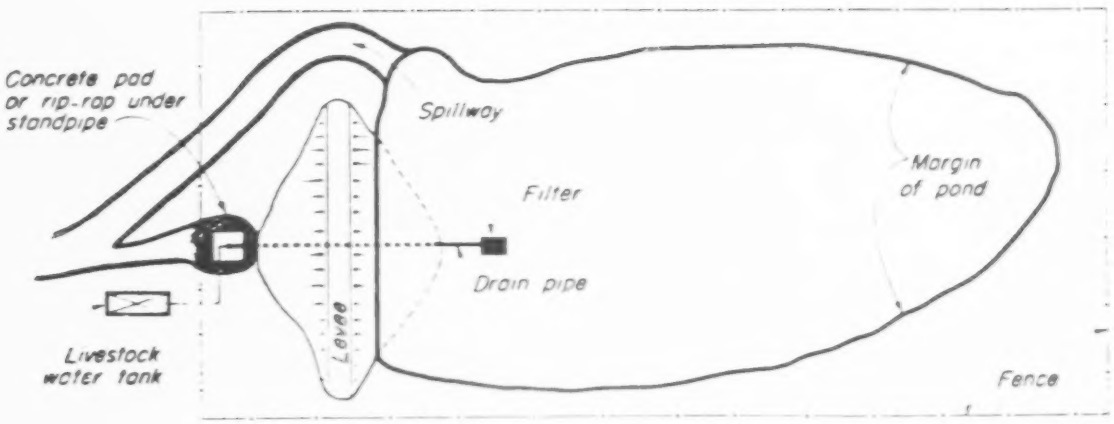
Sealing Ponds in Louisiana. Louisiana Cooperative Extension Service, #H-29, by William A. Hadden, Specialist (Agricultural Engineering).

Management of Southeastern Sportfishing Ponds. Bulletin 732, 1980, Cooperative Extension Service, University of Georgia Agriculture, Martin W. Brunson.



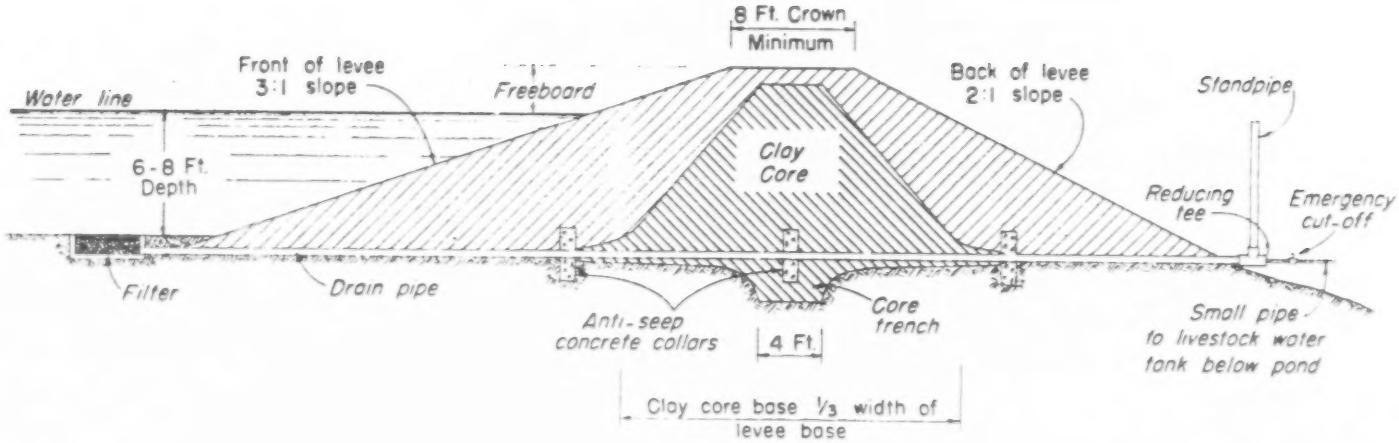
(Drawing by Eddie L. Bennett)

Sample layout pattern for building the levee.



(Drawing by Eddie L. Bennett)

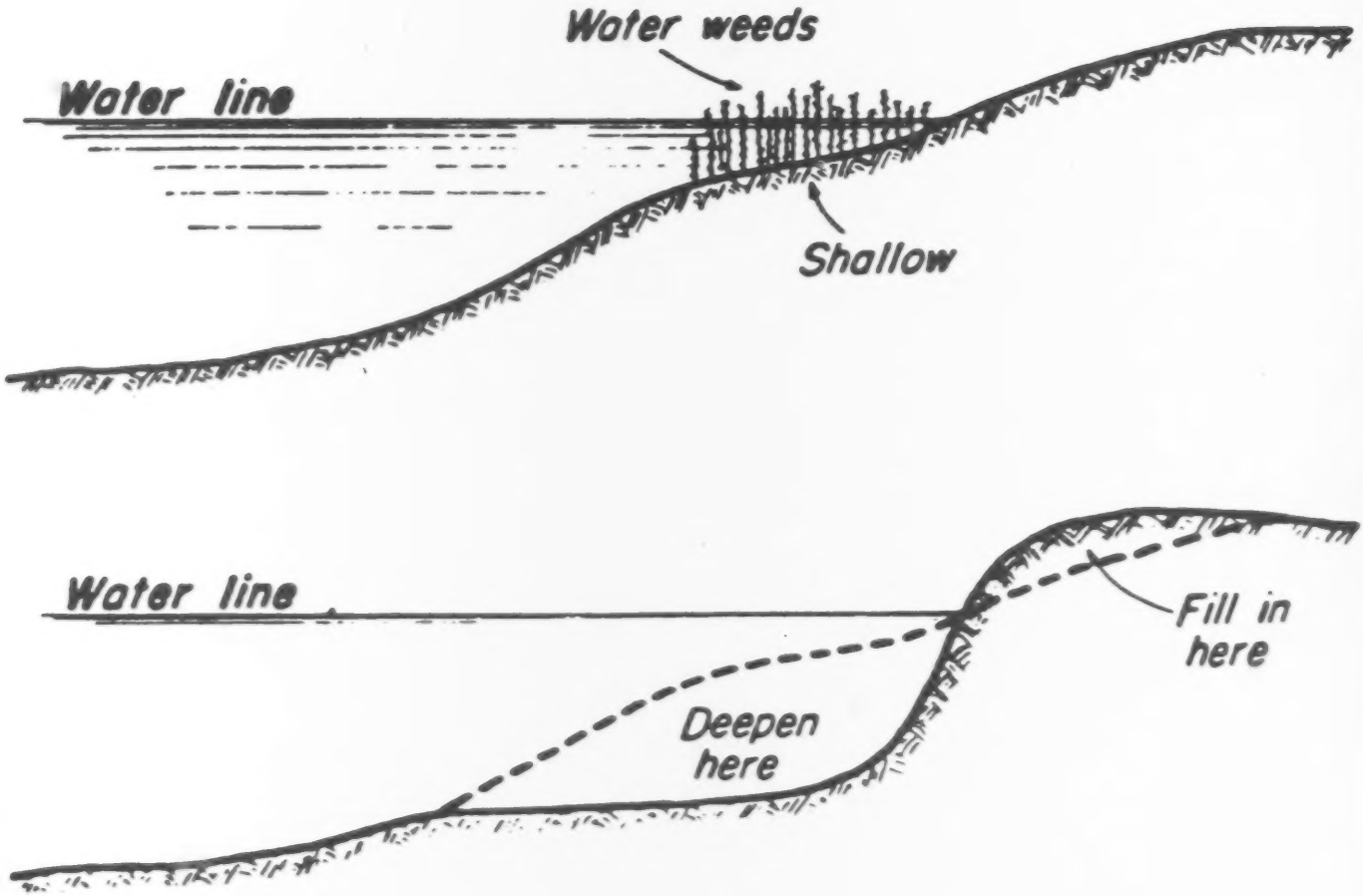
Sample layout of a good farm pond.



Cross Section of the Levee

(Drawing by Eddie L. Bennett)

IMPROVING ORIGINAL DESIGN



(Drawing by Eddie L. Bennett)

Example of how to eliminate shallow water along the shoreline.

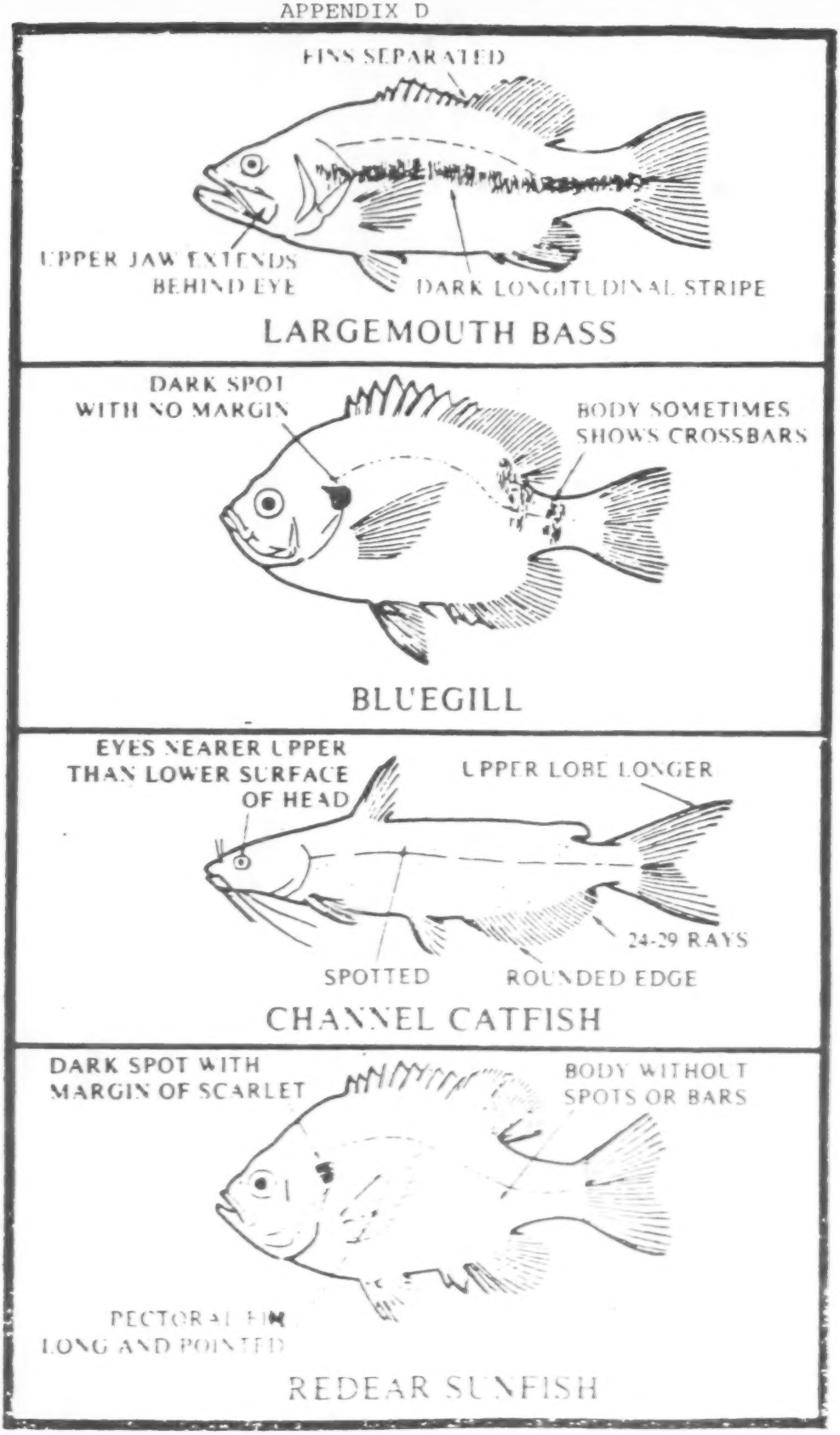


Figure 2. Fish most successfully stocked in warm water fish ponds. (Adapted from Pond Fish and Fishing in Illinois by [illegible])

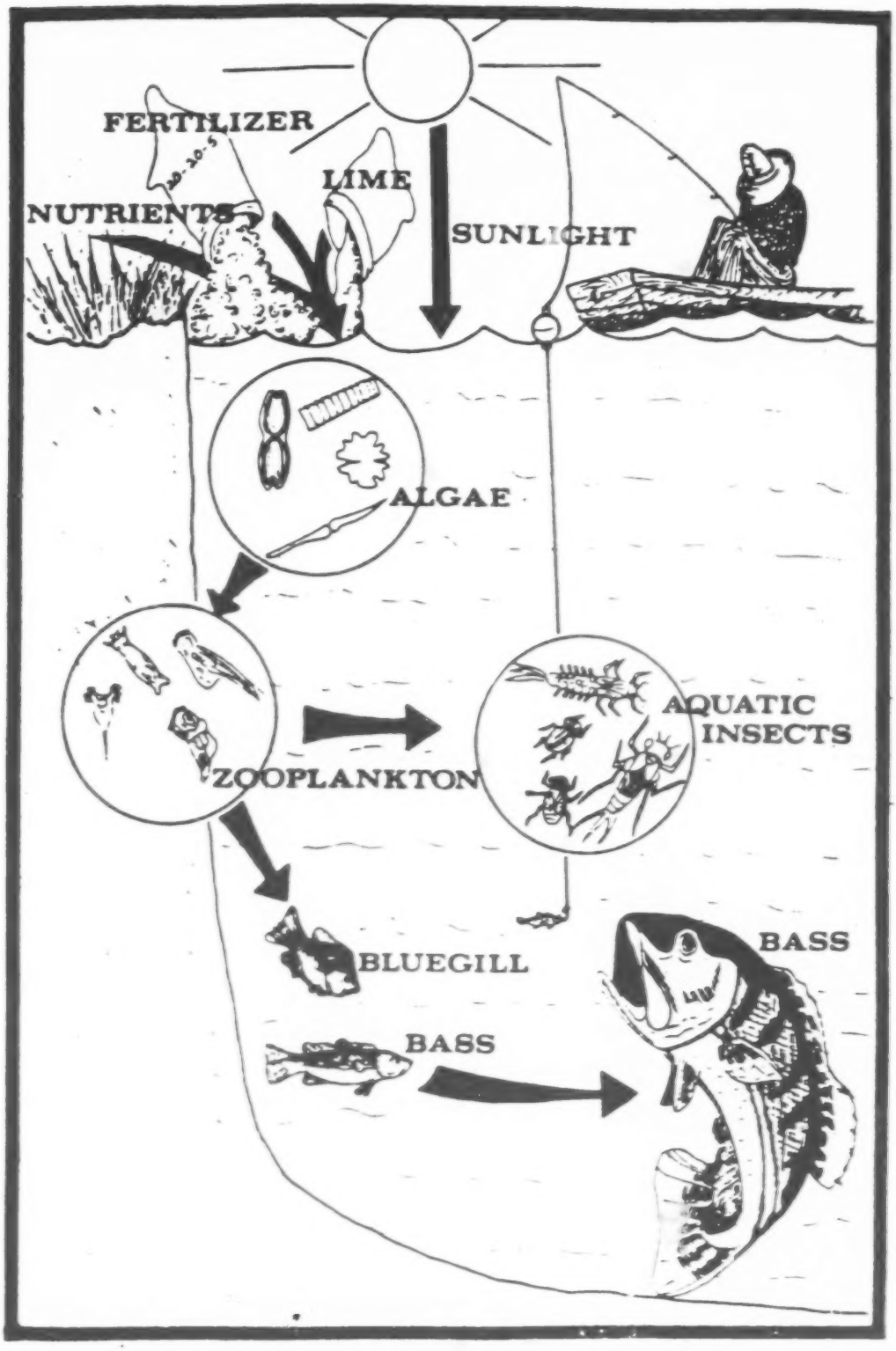


Figure 3. How fertilization and liming increase fish production. (Adapted from Alabama Fish Ponds by J. H. Crance).

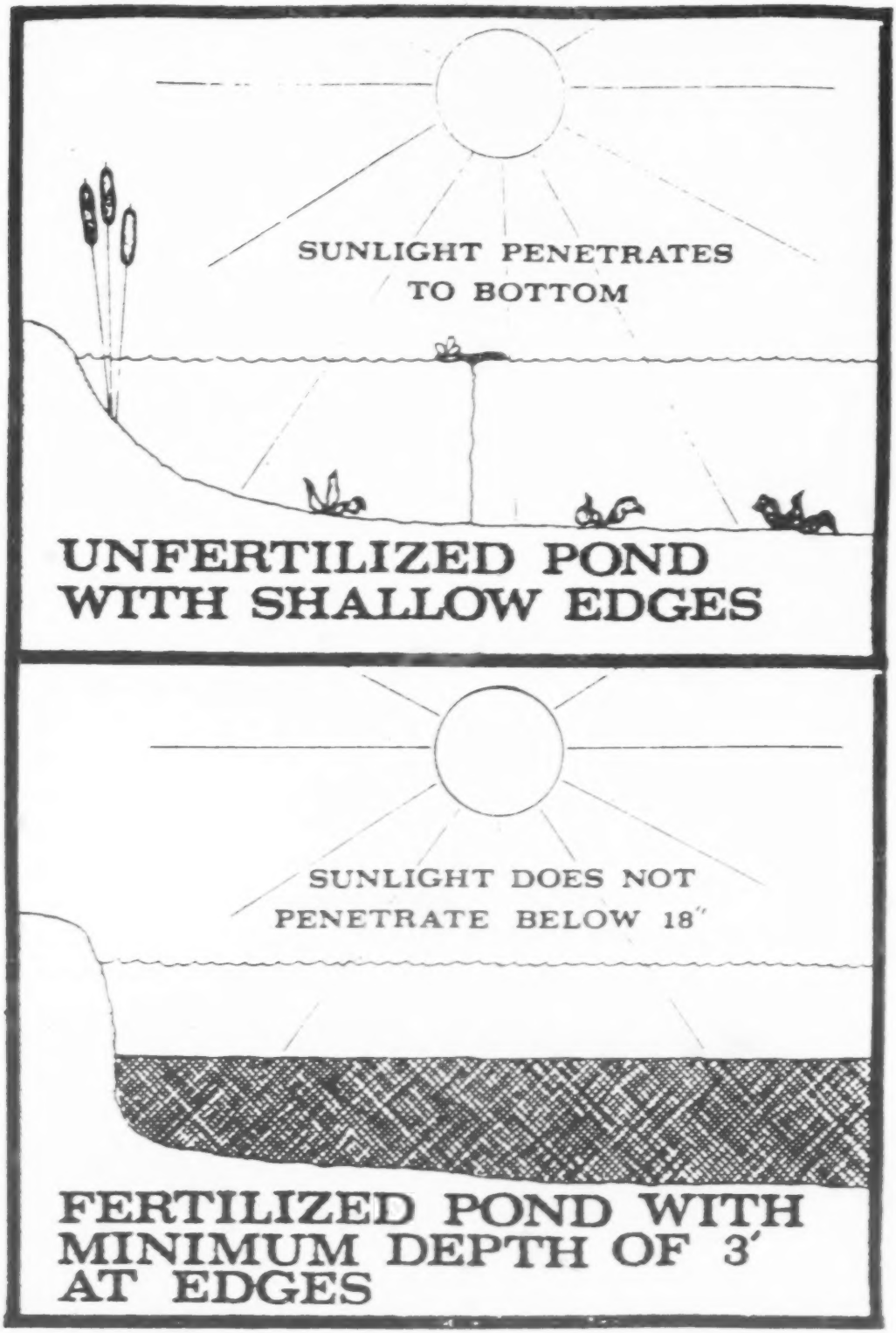
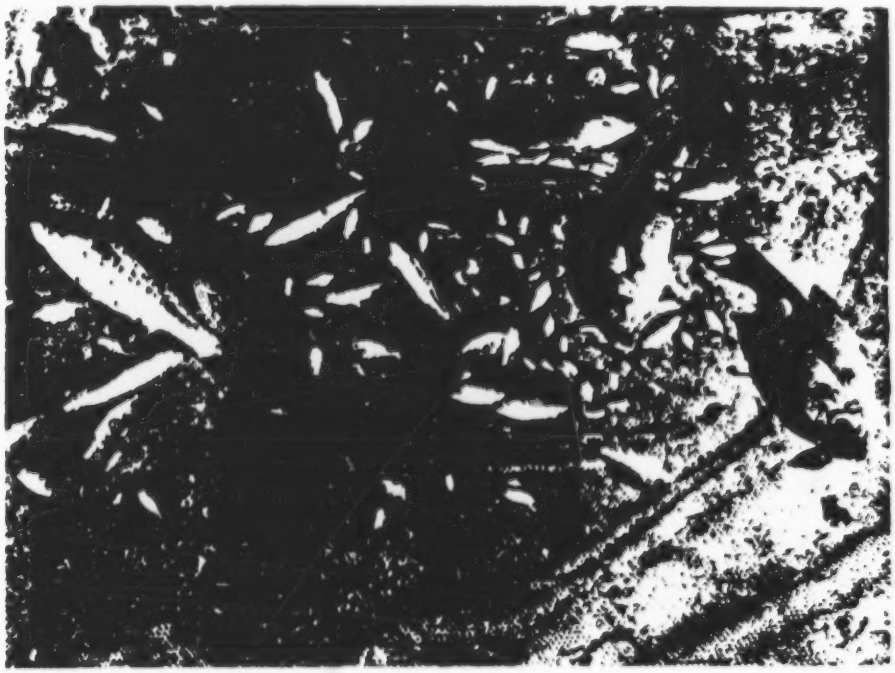


Figure 5. How fertilization controls aquatic weeds.

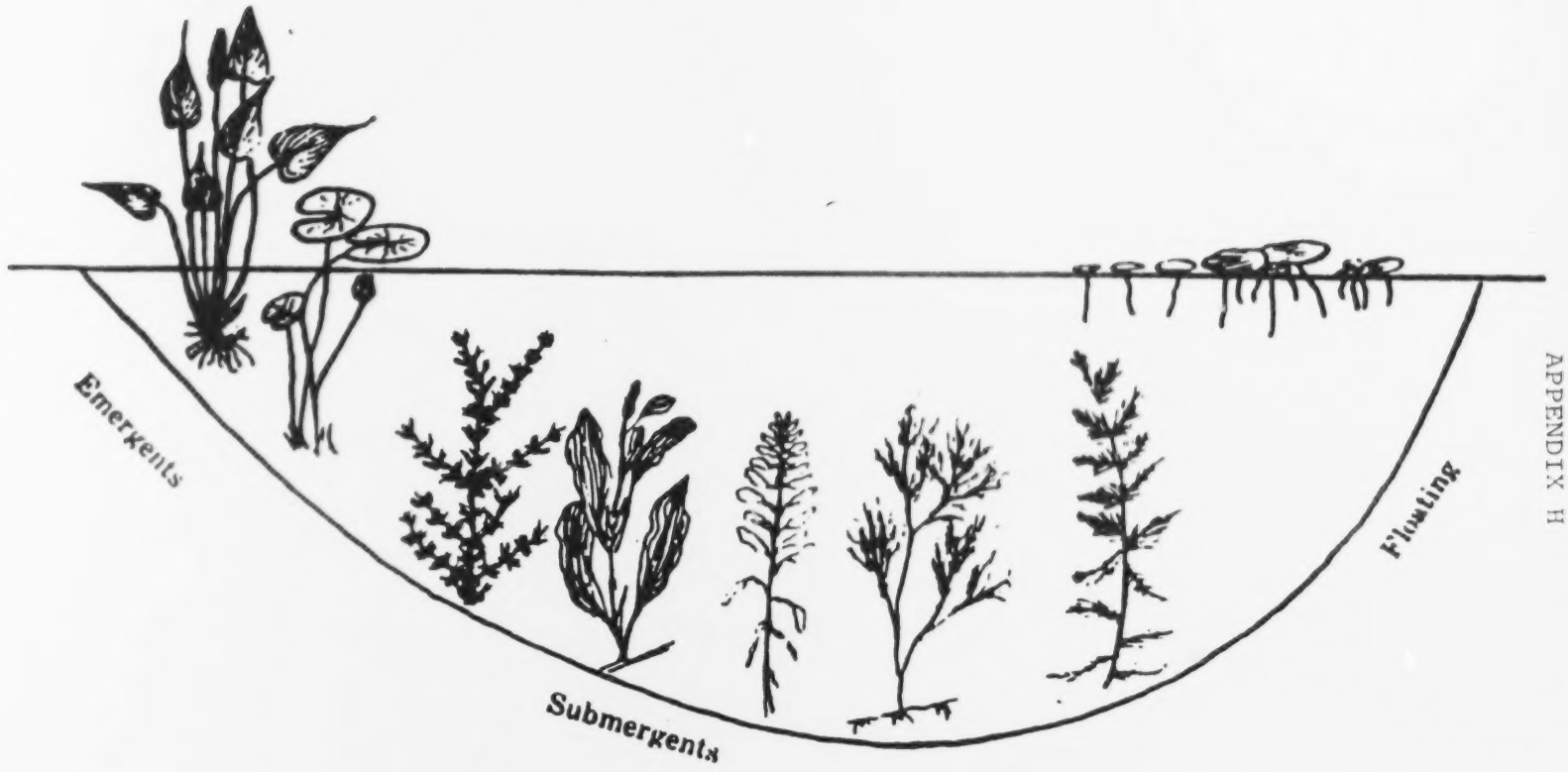
MAINTAINING BALANCE

The best and most enjoyable way to maintain balance in your pond's fish population is by fishing. This method of removing fish provides for continued growth of the fish remaining and greatly reduces the possibility of overcrowding. This helps maintain the balance between the fish and their food supply.



(Photo by Max W. Summers)

Seine sample taken from a balanced fish pond. Note the bass fingerlings and the many newly hatched bluegill. Also present are few intermediate bass and bluegill which further indicates a balanced condition.

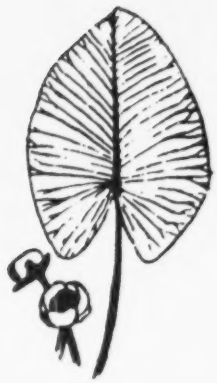


(Drawing by Sidney A. Gauthreaux, Jr.)

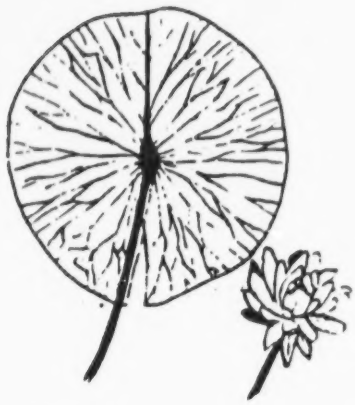
Cross section of a pond showing the various types of aquatic plants.

PICKERELWEED (Pontederia)

ARROWHEAD (Sagittaria)



SPATTERDOCK (Nuphar)

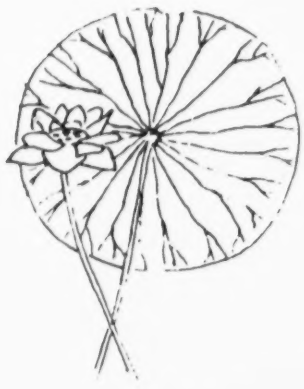


WATERLILY (Nymphaea)

WATERSHIELD (Brasenia)

CATTAIL (Typha)

ALLIGATOR WEED (Alternanthera)



AMERICAN LOTUS (Nelumbo)

(Drawings by Sidney A. Gautreaux, Jr.)

Common emergent aquatic weeds found in Louisiana ponds. These plants are rooted in the bottom and their leaves rise above or float upon the surface of the water.

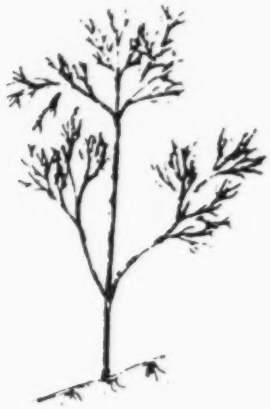
COONTAIL (Ceratophyllum)

FANWORT (Cabomba)

PARROT-FEATHER (Myreophullum)

WATERWEED (Elodea)

STONEWART (Chara)



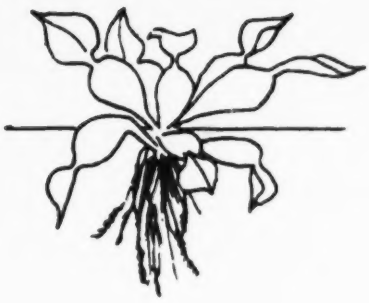
BUSHY PONDWEED (Najas)

WATERCELERY (Vallisneria)

PONDWEED (Potamogeton)

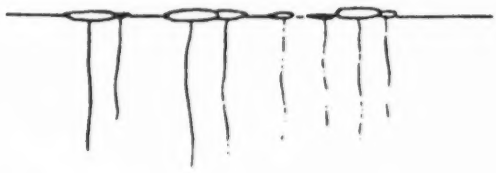
(Drawings by Sidney A. Gauthreaux, Jr.)

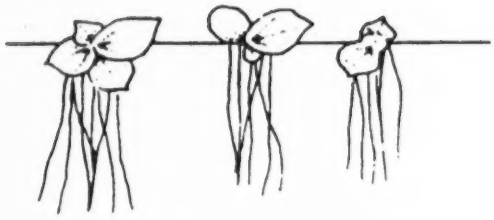
Common submergent aquatic plants. These plants have roots in the bottom and their stems and leaves rise to the surface or just beneath the surface.



WATER HYACINTH (Eichornia)

SMALL DUCK WEED (Lemna)





LARGE DUCK WEED (Spirodella)

BLADDERWORT (Utricularia)

(Drawings by Sidney A. Gautreaux, Jr.)

Common floating aquatic weeds. These plants are not rooted to the bottom; they float freely upon the surface of the water.